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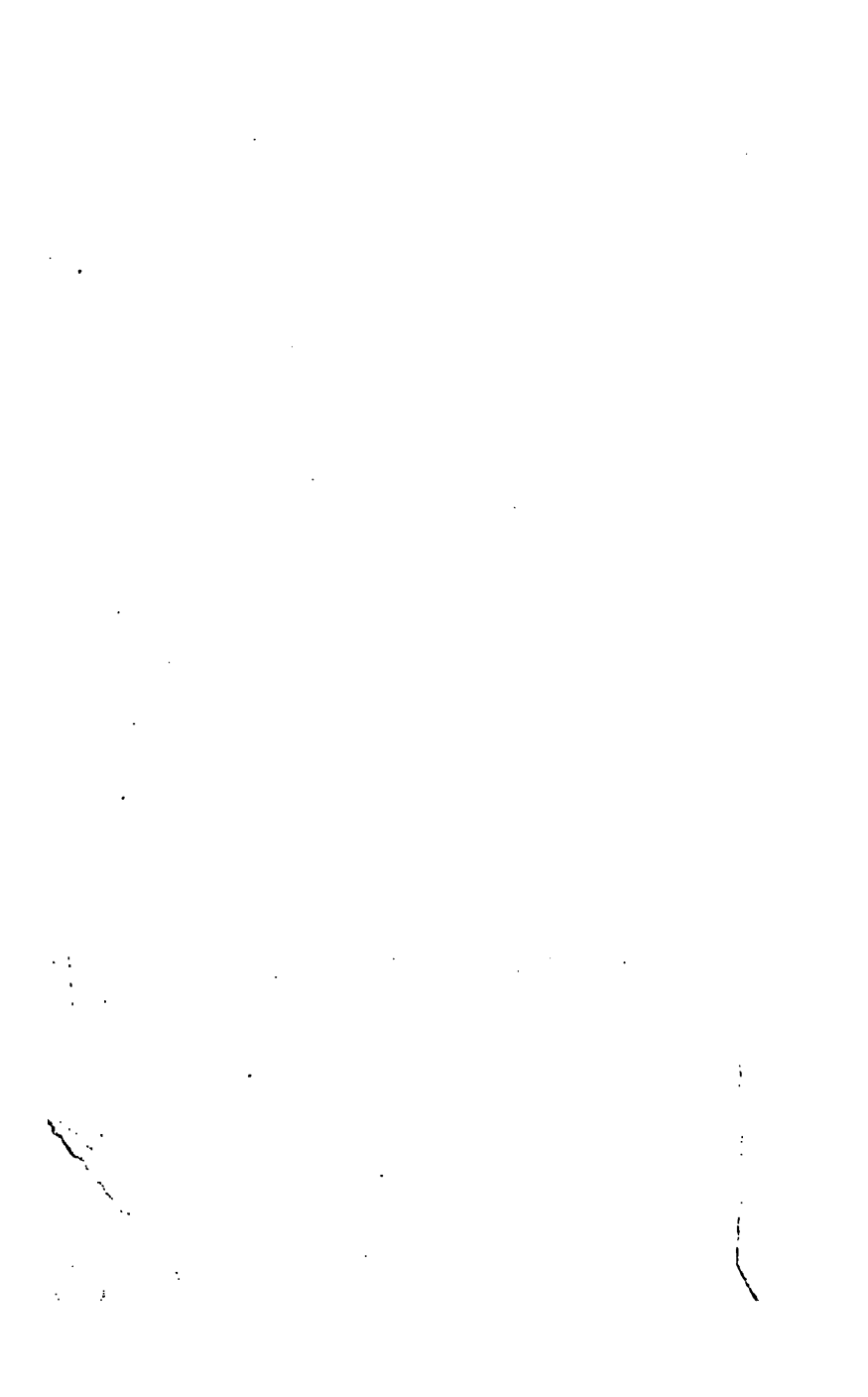
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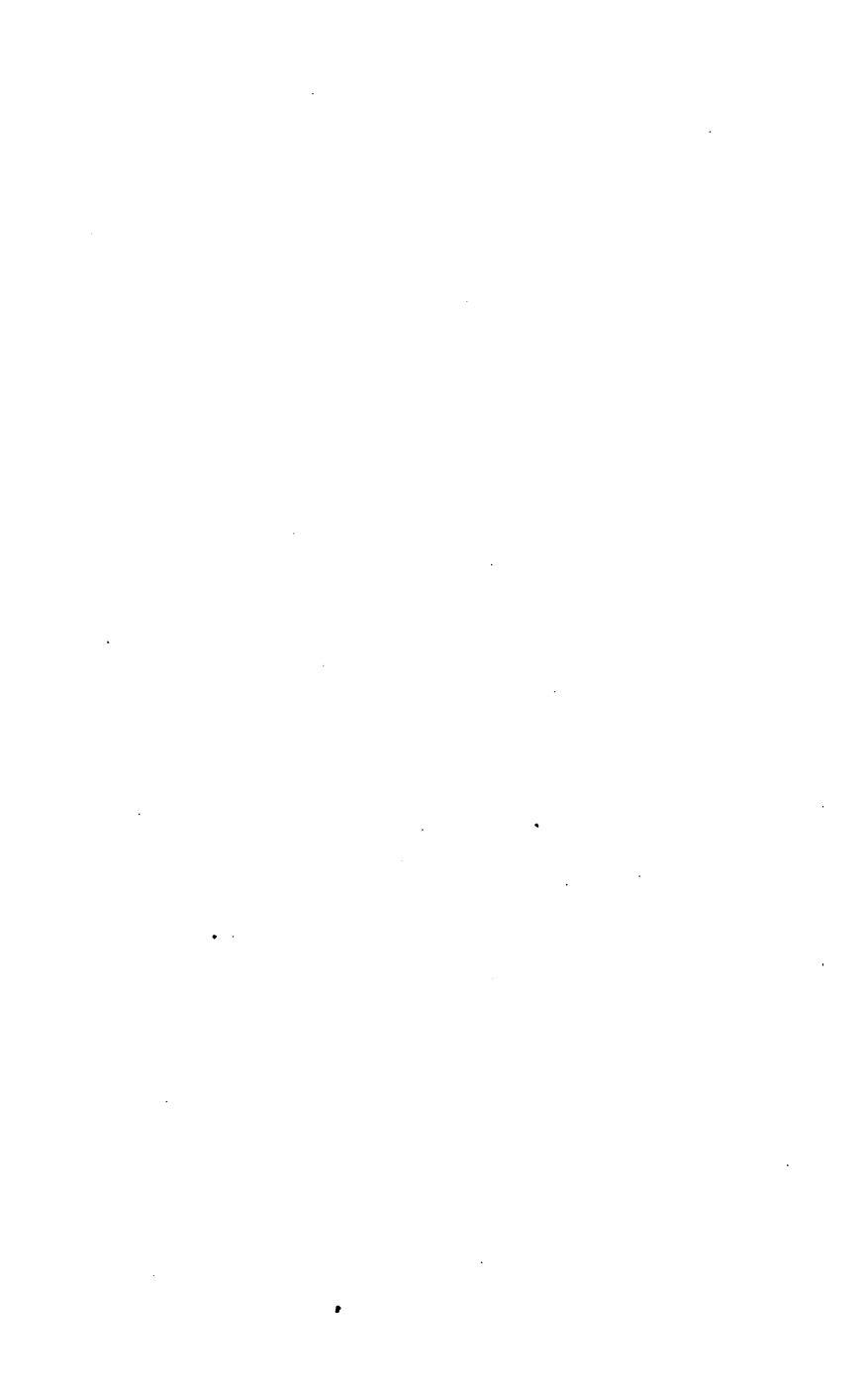
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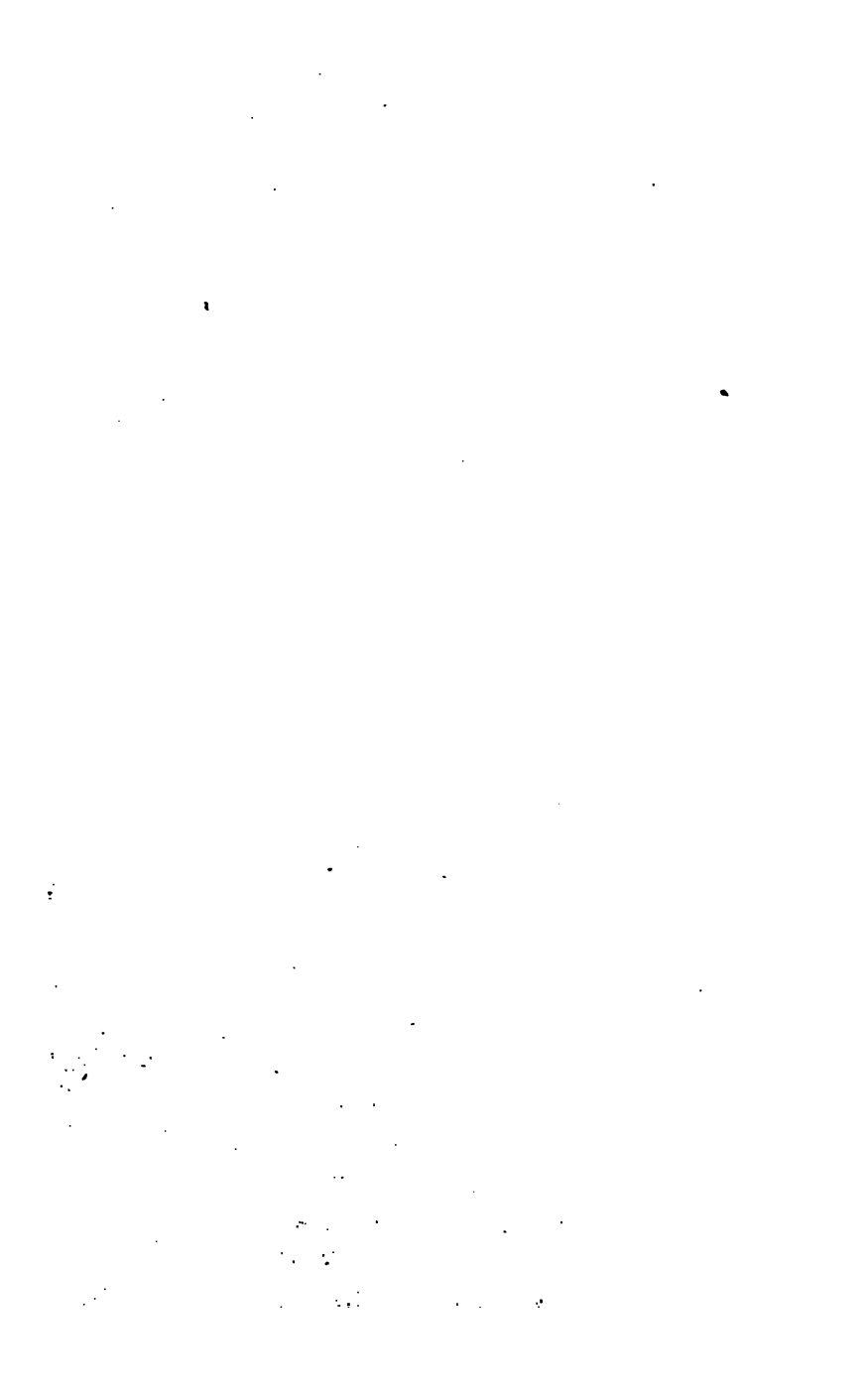






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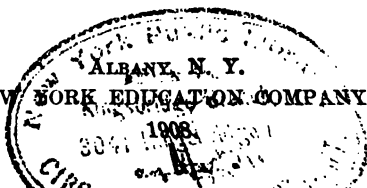
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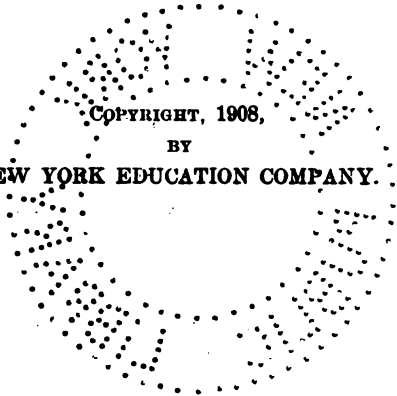
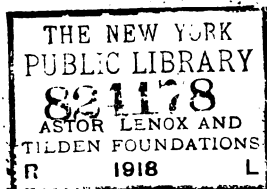
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PREFACE.

Careful observation of educational conditions shows the need of a practical review book covering the four fundamental subjects, spelling, geography, grammar and arithmetic.

This book is designed to meet such need and to help particularly three classes of people:

1. Students who with limited time to study wish to become more proficient in the common branches.

2. Teachers who desire practical supplementary material for review work in the classroom.

3. All persons who are preparing to take civil service, regents', or teachers' examinations in which knowledge of the fundamental subjects is required.

The questions and answers have been selected and prepared with great care, and all of them have been used in recent examinations, some by the New York State Education Department, some by the examining boards of other States, some by the New York State Civil Service Commission and some by the United States Civil Service Commission. The questions are such as are likely to be asked on future ex-

aminations and the answers such as have been accepted in past examinations. The compilers are convinced that altogether this book contains the best collection of examination material on the subjects covered that has ever been published in one volume.

It has been deemed advisable to include several brief essays on the various phases of examinations, which will be found helpful by those who prepare, rate or take examinations. These essays are the result of observations made by Mr. Pollock during a long experience as a civil service examiner.

The civil service material in the back part of the book will be found of great value to any who may be seeking to enter either the State or federal service.

In presenting this first edition to the public the editors invite criticisms and suggestions in regard to future editions.

THE EDITORS.

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CITY OF NEW YORK.

INTRODUCTION.

How to Prepare for an Examination.

It is assumed that any person, who is to take an examination has the scholastic training, physique and experience necessary to fit him in a general way for the test he is to undergo. If he has not such qualifications he should not enter the examination. Having the preliminary qualifications as a rule, however, is not enough. If the candidate is to stand high he must make special preparation.

The best special preparation for an examination consists of three steps, viz.:

1. *Finding out definitely the nature and extent of the examination.*
2. *Study of the exact ground to be covered by the examination.*
3. *Practice or drill on the tests to be given at the examination.*

Examinations are of so many different kinds that the three steps given will not apply in full measure to all, but one or more of the steps will be found useful to every candidate.

1. FINDING OUT THE NATURE AND EXTENT OF THE EXAMINATION.

There are precedents for nearly all examinations and there are manuals and syllabuses issued by nearly all examination boards. Having decided to take an examination the candidate should obtain all the information possible in the way of circular announcements, manuals, syllabuses, sample questions, etc. These may be obtained by writing to the office whence the examination originates. Civil service commissions as a rule furnish

all necessary information free of charge. The New York State Department of Education charges a small fee for the syllabus of academic requirements and for sample questions. Having obtained an outline of the examination and some specimen questions, the candidate must study the outline and note the way the questions cover the subjects indicated in the outline. Too much dependence must not be put on the specimen questions, as different examiners will apply outlines in different ways. It is always worth while, however, to become familiar with all the specimen questions accessible and to be sure that the answers are all known. The questions and answers in this book will be found of great value in indicating the type of question most often asked and what constitutes a full answer.

2. STUDY OF THE EXACT GROUND TO BE COVERED BY AN EXAMINATION.

Here the judgment of the candidate must play a great part. He must assume that the examination will be entirely within the outlines as given in the circular announcing the examination or in the syllabus or manual. He must also assume that the examination will be a reasonable test. In a civil service examination it is safe to assume that the examination will bear some relation to the salary and duties of the position for which the examination is given. High-salaried positions generally require persons of trained minds, and examinations for such positions will usually consist of comprehensive questions. On the other hand, low-salaried positions as a rule require ordinary ability, and examinations for such positions will be simple and straightforward. Regents examinations require a fair knowledge of the whole of a subject. It is assumed by the examiners that candidates in Regents examinations are just completing a subject and consequently have a fresh

knowledge of all parts of it. In civil service examinations the test is not primarily one of knowledge of subject-matter, but rather fitness for a certain position as shown by the knowledge exhibited in the examination. This distinction must be kept in mind by the candidate.

Having determined what to study, the candidate must use all his spare time in systematic work covering the ground thoroughly as he goes. If the examination is to consist of several subjects it is better to study each subject a part of every day than to give the time of any day to one subject. If the candidate is deficient in one subject only it is well to concentrate the work of preparation on that subject. For a competitive examination, however, it is best to make a thorough review of each subject.

If the time of preparation is short and the candidate deems it important to stand high, he will sometimes find it advisable to employ a well-qualified instructor and take regular lessons up to the time of examination.

3. PRACTICE OR DRILL ON THE TESTS TO BE GIVEN AT THE EXAMINATION.

In many cases time is an important element in examinations. The candidate is required not only to perform the work of the test, but in order to obtain a perfect mark, he must perform the work within a given time. In tests in stenography, typewriting, rapid computation, rapid copying, etc., the time standard is usually high and a large part of the candidates fail to obtain a good mark in these tests. The difficulty is not in the knowledge of the candidate but in his skill and alertness.

As skill is such an important factor in these examinations the candidate should spare no pains to become as expert as possible along the lines required in the examination. Regular practice of similar tests is all that is required in most cases.

For the more difficult tests, such as rapid stenographic and typewriting work, drill under a competent instructor is essential to success. Specimen tests in rapid addition and computation are found in another part of this work and the candidate will do well to practice these and others of a similar nature.

In civil service examinations for policemen, jailkeepers, prison guards, etc., candidates are given a physical examination including certain tests of strength and agility. If the candidate is not a good athlete, he should undergo a course in physical training such as is given to college crews or athletic teams. The tests to be taken in the examination should be practiced every day and the greatest care should be taken to keep the body in perfect health.

It must not be forgotten that the best preparation for an examination is that which is not hurried, but that continues for a period long enough for the candidate to become proficient in the subjects of examination.

How to Take an Examination.

In order to take an examination with the greatest success the candidate must come to the examination room in the best possible physical condition, his mind must be clear and his nerves in full control of the body. It is rank folly to study late the night before the examination. Cramming just before an examination rarely pays, and when carried late into the night robs the body of its needed rest and consequently dulls the mind for the effort of the next day.

The candidate should provide himself with pen and ink and other instruments, if such are necessary, and present himself at the examination room at least fifteen minutes before the time set for the examination. If possible he should secure a seat near the front of the room where light and heat

are most favorable. The special instructions issued to competitors should be carefully read and observed to the letter. When the preliminaries are finished and the questions are given to the candidate, he should concentrate his mind on the work before him. If all the questions are to be answered he should begin at the first question, write out the answer at once and proceed in order with the others. If a choice of questions is allowed, the candidate should promptly select the questions he can answer best and answer them in order. In writing an answer, care should be taken to express the various ideas of the answer in logical order and to make sure that all points essential to a full answer are given. Information not asked for should not be given, but the candidate should read the question carefully and give a clear, direct and full answer. Time should not be wasted on questions that cannot be answered by the candidate. If such questions are found, a space should be left on the answer sheet and the next question taken up. After all the questions that can be readily answered are finished the candidate should go back to the questions passed over and answer them in part or wholly if possible to do so. Sometimes a question admits of only two answers which are usually directly opposed. If the candidate finds such a question and is not sure which answer is correct, he should give the one he thinks is probably correct and the chances are 1 to 2 that his answer will be right. As every partially correct answer adds something to the total standing, a reasonable guess is better than no answer at all.

After all the questions on the paper are answered the candidate should carefully read over the paper and make corrections if any are necessary. The answer paper when handed in should be as perfect as the candidate is able to make it.

The most common faults of candidates in taking examinations are lack of care, undue haste,

waste of time in thinking over difficult questions, doing work twice (thus losing valuable time), unnecessary omission of answers and not writing full answers. All of these faults can and should be avoided.

How to Prepare an Examination.

In preparing an examination the examiner must take the following points into consideration:

1. *The purpose of the examination.*
2. *The scheme of the examination.*
3. *The grade of the examination.*
4. *The kind of questions most suitable for the examination.*
5. *The length of the examination.*

1. THE PURPOSE OF THE EXAMINATION.

What purpose is to be served by the examination, is the first question to be asked by the one who prepares the examination. Is the examination to test a pupil's proficiency in a part or whole of a subject? The questions will cover the ground which should be familiar to the pupil. Is the examination to test a candidate's fitness to be licensed for a trade or profession? The questions will be chosen with a view to maintaining the standard of the trade or profession. Is the examination to test a candidate's fitness or relative fitness for a civil service position? The questions will relate to the knowledge and skill required of the incumbent of the position.

2. THE SCHEME OR PLAN OF THE EXAMINATION.

Given the purpose of an examination, the next step is to make a plan of examination to accomplish the purpose. This necessitates the choosing of the subjects or tests to be used and the assignment of relative weights. In school, where the separate examinations consist of one subject only,

the only plan necessary is to decide the relative importance to be assigned to the various parts of the subject. In civil service examinations the scheme becomes a more difficult matter. It is of the highest importance that civil service examinations be practical tests for the positions to be filled. Care must be taken in arranging an examination that the subjects chosen and weights assigned will be such as will test the proper qualifications for the place. Schemes that have been successfully used in examinations by the United States Civil Service Commission and the New York State Civil Service Commission are found in another part of this work.

3. THE GRADE OF EXAMINATION.

Before preparing any questions, the examiner must form a clear conception of the standard to be applied in the examination. The failure of examiners to set questions of the proper grade is the most common fault in examinations. Nearly all examinations are either too easy or too difficult.

In civil service work the grade of the examination is determined by two considerations—the salary of the position and the nature of the work required by the position. If the salary is low and the work of the position is simple, then the examination should not be difficult, but if the salary is high and expert or high-class work is required, then the examination must be so difficult that only a well-qualified person can pass successfully.

In school and college examinations the grade must be determined by the nature of the work done in the institution and by the work that the average student is able to accomplish under given conditions.

In licensing examinations the grade must be determined by the standards of the profession and the aim of the examinations should be to elevate the profession as much as practicable.

4. THE KIND OF QUESTIONS MOST SUITABLE FOR THE EXAMINATION.

Much has been written on the art of questioning and the line between good and bad questions is well defined.

A good question for use in examinations has the following characteristics:

It must be clear and concise.

It must refer to but one leading idea.

It must give no suggestion of the answer.

It must not require YES or NO for an answer.

It must not require the choice of two alternatives for an answer.

It must be of the proper grade.

It must balance well with the other questions of the same paper.

It must require a definite answer and one that is not required by any other question in the same examination.

The foregoing general requirements of questions must be kept in mind by the examiner in preparing an examination, but other considerations also demand attention. The questions must not be the same as those given in previous examinations of the same kind, but they must be of approximately the same grade unless there is good reason for a change. They must not place undue emphasis upon any one part of the subject of examination. They must be appropriate and in civil service and licensing examinations as practical as possible.

5. THE LENGTH OF THE EXAMINATION.

Examinations vary in length from one hour to one week, according to their purpose and scope. Some examinations, such as those given for the purpose of licensing candidates in medicine, must necessarily be long, but as time is valuable, no examination should be longer than is necessary to secure the desired result.

When the time of an examination is fixed, the examiner should plan his questions so that they can be answered without hurry by a candidate working at a moderate rate of speed. Nothing is gained by trying to crowd in too much in an examination and much may be lost. The candidate has a right to assume that he will be given reasonable time to write full answers to each question, and if such is not the case, the examination will prove a failure. If in doubt about the length of time required to answer a paper the examiner will do well to write out the answers and note the time required. The candidates should be allowed at least twice the time consumed by the examiner. As most people work slowly in mathematics, the time consumed by one thoroughly familiar with a paper in this subject is not so good a measure as in other subjects. In mathematics candidates should be allowed at least four times the time required by the examiner to do a given piece of work.

How to Rate Examinations.

The principle in rating answer papers of examinations is to assign each answer its proper value, according to the scale chosen. Using 100 for the mark for a perfect answer, if an answer is half correct it should be rated, 50; if three-fourths correct, 75; if one-third correct, $33\frac{1}{3}$.

The principle is axiomatic; its application in many cases is not easy. When a question like a problem in addition involves a certain number of equal processes the rating of the answers is merely a matter of proportion. But when a question calls for a discussion of some theory in economics or philosophy it often becomes difficult to assign the answers their proper value. The following rules for the rating of papers used by the New York State Civil Service Commission are the result of much experience and will be found very suggestive to examiners:

Rules for Marking Examination Papers.

In subjects for which specific rules of marking are not prescribed, the examiner will usually prepare a scheme of marking for each question, so as to be able to explain his marks in case they are questioned.

All examination papers shall be marked under the following rules:

Mark every correct answer..... 100

Mark every faulty answer according to its value on a scale of 100, or as specifically directed below, deduct the sum of the error marks of such answer from 100.

When the question requires in the answer a specified number of states, countries, persons, places, locations, or things, the quotient arising from the division of 100 by the number of states, countries, etc., required shall be the credit to be given for each state, country, etc., correctly named. If a greater number is given in the answer than is required, the additional number of states, countries, etc., shall be added to the number required by the question, and the quotient arising from the division of 100 by the number thus obtained shall be the credit to be given for each state, country, etc., correctly named.

Rules for Marking Spelling.

	From 100 deduct —
1 For each error in spelling when the exercise consists of 50 words.....	2
2 For each error in capitalization (total charge not to exceed 10).....	1
3 For each failure to use the hyphen when required in a compound word	1
4 For each wrong use of the hyphen..	1
5 For dividing a word, properly written solid, into two or more parts,	

From 100
deduct —

each part being a distinct word, or for writing a simple word as a compound word	1
6 For each improper use of the apos- trophe	1

Rules for Marking Copying from Plain Copy.

1 For each error in orthography.....	5
2 For each word or figure omitted, re- peated, or improperly inserted....	5
3 For each word inserted or added....	5
4 For each word or figure substituted.	5
5 For each transposition.....	5
6 For each abbreviation not in the copy	5
7 For each failure to capitalize accord- ing to copy.....	5
8 For each failure to punctuate accord- ing to copy.....	5
9 For each failure to paragraph accord- ing to copy.....	5
10 For irregularity in left-hand margin.	5
11 For misdivision of a word at the end of a line.....	1
12 For each omission or improper use of the hyphen in dividing a word at the end of a line.....	1
13 For failure to indent as in copy (only one charge to be made in the exercise)	5
14 For each variation from the printed copy in the use of parentheses, brackets, or the hyphen.....	5
15 For each word altered, interlined, or canceled, for each blot, and for each minor erasure, if not neat: <i>Provided</i> , That not more than 5 shall be charged for one interlinea- tion or cancellation or for blots...	1

	From 100 deduct —
16 For failure to indicate, or for im- properly indicating, italics, small caps, etc.	5
17 For using stenographic period (thus ×), only one charge to be made in the exercise	5
18 For signing name.....	5
19 For misplacement, want of neatness, etc.	3 to 5

Rules for Marking Copying from Rough Draft.

1 For each error in orthography, pro- vided that no charge shall be made for the repeated misspelling of the same word or stem in the same manner	3
2 For each error in syntax, provided that no additional charge shall be made for changes necessarily re- sulting from a given method of correction or attempted correction.	3
3 For each change in tense, number, etc., which does not result in an error of syntax or essential change in the meaning.....	1
4 For each word omitted, inserted, or substituted involving a test or essential change of meaning, (not more than 10 to be charged for the first ten words of each omission, and one for each word thereafter, and not more than 10 for the omis- sion of each indicated insertion) ..	3
5 For each word omitted, inserted, or substituted involving no test or essential change of meaning, and for each word repeated.....	1

	From 100 deduct —
6 For each error in capitalization, punctuation, indention, paragraphing, or in division of words.	1
7 For each error in transposition of inclosures	5
8 For each error in transposition of words or groups of words, provided that for a transposition of two words which improves the sentence and involves no test no charge shall be made.....	3
9 For each abbreviation.....	1 to 2
10 For each failure to use hyphen when required, or for each wrong use of the hyphen	1
11 For irregularity in left-hand margin.	1 to 3
12 For each word interlined or canceled (charge not to exceed 5 for any one interlineation or cancellation), for each blot, and each alteration if not neat	1
13 For stenographic periods (as ×), only one charge to be made.....	3
14 For signing candidate's name.....	5

Rules for Marking Penmanship.

Mark penmanship according to its value on a scale of 100.

In determining the mark on penmanship, legibility, rapidity, neatness, and general appearance, as well as correctness and uniformity in the formation of words, letters, and punctuation marks, will be considered, and the examiners will be guided generally by the following scheme: Perfect, 100; very excellent, 99 to 95; excellent, 95 to 90; very good, 90 to 85; good, 85 to 80; ordinary, 80 to 70; poor, 70 to 65; very poor, 65 to 50. Below the grade of "very poor," 50 to 0.

Rules for Marking Letter Writing.

In marking the letter, its errors in form and address, in spelling, capitalization, punctuation, syntax and style, and its adherence to and treatment of the subject given will be considered, and its value in the judgment of the examiners marked on a scale of 100.

In determining the mark for letter writing, the examiner will be guided generally by the following scheme: Excellent, 100 to 90; good, 90 to 80; fair, 80 to 70; ordinary, 70 to 60; poor, 60 to 50; very poor, 50 to 25; practically worthless, 25 to 0.

Rules for Marking Arithmetic.

The examiner will prepare a scheme for marking each problem, giving proportional weights to the various steps or processes on the scale of 100. Charges for errors in computation in any step or process will not exceed the weight given such step or process.

No credit will be given for a wrong process.

For errors in work or operation, the following charges will be made:

	From 100 deduct —
1 For error in pointing off decimals in multiplication or division.....	25
2 For error in omitting decimal point or in pointing off decimals in addition or subtraction.....	10
3 For each evasion of a decimal or common fraction test in the solution of a problem.....	25
4 For each error in computation, provided that in solutions where the possible maximum number of chargeable errors in computation is less than 10, a proportionate charge shall be made for each error	10

INTRODUCTION.

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	From 100 deduct —
5 For error in copying figures from printed question or from work, wrong result being obtained.....	10
6 For error in copying figures from printed question or from work, right result being obtained.....	5
7 For indicating wrong process, but performing correct process.....	5
8 For each improper use of the symbol or designation % or ¢ in connec- tion with a decimal expression...	10
9 For each improper or incorrect desig- nation of a partial or final result..	5
10 For failure to indicate the answer in problems by the letters "Ans.," or otherwise, when the answer is ob- scured by improper arrangement..	5
11 For each failure to use the sign \$ or £, or any other monetary or com- mercial sign, or any sign by which the relations of quantities are ex- pressed, when the use of such is required in the statement or solu- tion of a problem	5
12 For each error in denominate num- bers in quantity of one denomina- tion contained in a unit of a higher denomination	15
13 For fractions in answers not reduced to lowest terms.....	5 to 10
14 For an approximate result not suffi- ciently exact	5 to 10
15 If, when work or operation in full is required, the correct answer is given, but no work is shown.....	40
16 If, when work or operation in full is required, the process is indicated, but no work or only part of the work is shown.....	5 to 40

	From 100 deduct —
17. For superfluous or irrelevant work not canceled	10
18 For giving proof instead of solution, according to gravity of error.....	10 to 75
19 For complex statement, process or method, right result being pro- duced	10
20 If, when work or operation in full is required, an approximate answer is given, but no work is shown or indicated, charge 40 for omission of work and deduct from 60 a pro- portionate charge for number of figures incorrect.	

SPELLING.

ity

SPELLING.

Grade 1.

Words Used in Regents Examinations, Teachers
Examinations and New York State and
United States Civil Service
Examinations for
**TEACHERS, CLERKS, STENOGRAPHERS, BOOK-
KEEPERS, ETC.**

nationality
voluntary
zealous
language
Pennsylvania
encourage
character
sufficient
Delaware
spacious
interrupt
continually
mysterious
effigy
recommend
enthusiast
casual
gradually
dissipate
collateral
treatise
mandamus
illegal
peremptory

infallible
paramount
relative
warrant
discretionary
consecutive
deficient
citation
inhabitant
association
various
pretension
community
bereavement
assignment
diligence
solicitude
democracy
damageable
pinetieth
spectacle
eccentric
analysis
occupy

INTRODUCTION.

18

SPELLING.

From J^c

de

demurrer	maintenance
session	illustrate
indictment	communication
defendant	interpreter
burglary	typography
replication	competitive
felonious	pursuant
judgment	Connecticut
malice	exemption
jurisdiction	constitutionality
appeal	deposition
execution	interrogatory
verification	San Francisco
summons	Providence
injunction	Poughkeepsie
intestate	documentary
administrator	confinement
account	concurrence
intention	advertisement
juridical	decendent
California	Minnesota
colloquy	application
post mortem	neighbor
entail	enforcement
authority	illegitimate
proceedings	advancement
bona fide	testamentary
Rochester	validity
calumny	controversy
amicable	physical
Massachusetts	miscellaneous
summary	contingent
successive	stenographer
surety	syndicate
inimical	eighty-two
qualify	affiliation
referee	policeman
efficiency	memorandum
sentence	felony
dissension	privileges
abeyance	Rensselaer

capacity	medallion
efficient	loneliness
gigantic	formulate
curiosity	vigorous
simplicity	favorite
society	franchise
legendary	solely
achievement	treasury
gorgeous	disappoint
validity	spurious
literal	Louisiana
survivor	communicate
separate	habitual
rarefy	criticism
fraudulent	deliberate
accommodate	correspondence
chisel	concession
transient	diligent
scenery	Illinois
perceive	corporation
salutary	discipline
heighten	loser
ancient	committee
believe	pharmacy
regularly	legislature
Cleveland	lineal
cemetery	parallel
corroborate	salable
manual	apparent
reformatory	essential
machinery	precise
industrial	illegible
competent	surgeon
vigilance	evasion
immense	precede
doubtful	cordial
excess	generous
defaulter	league
education	suspicious
authorize	inherit
impel	occasion

Chemung	guarantee
variance	appliance
imminent	propitious
Tennessee	utensil
caution	gratify
Susquehanna	grieve
ordinarily	fragile
egregious	utility
Milwaukee	expansion
rarity	resources
spontaneous	movable
February	insolvency
terrify	achieve
excusable	panel
recompense	intrinsic
influence	notorious
equalize	Genesee
Ontario	certificate
certiorari	calendar
superior	promissory
vice versa	proceeds
equitable	counterfeit
infancy	dividend
Manhattan	voucher
coverture	barrel
attachment	average
Erie	indemnity
immediate	receipt
bargain	insurance
invoice	revenue
financier	surrogate
freight	sufficient
acceptance	receding
ballot	apperception
customary	Tuesday
precious	compliance
familiar	physical
expensive	chloroform
delegation	anxiety
currency	tendencies
sloping	infinite

imitate	elasticity
unceasing	believing
endorse	pitcher
assets	scrupulous
premium	Minneapolis
liabilities	temperance
instant	wielding
receive	colleague
remittance	capricious
accrued	almanac
surplus	acquitting
defalcation	armies
ledger	appreciate
tariff	characteristic
coupon	version
remunerate	prejudice
rebate	puzzle
indenture	season
protest	orchestra
equivalent	gesture
completion	practical
hostility	gratitude
filial	centennial
peasant	conceit
vicinity	autopsy
expedient	rigor
shrewd	assassin
ceiling	stalwart
disability	collateral
relieve	ridiculous
potato	facilitate
Missouri	epitaph
colossal	prefer
guardian	preferable
exceed	apology
government	civilian
Seattle	manageable
affidavit	appellate
mortgage	riddance
citizen	occurred
commercial	chaplain

bullion
 Nebraska
 security
 conference
 maximum
 stationery
 negotiable
 disbursement
 compromise
 monopoly
 bankrupt
 weight
 notary
 abbreviate
 creditor
 tenant
 controlling
 peculiar
 cashier
 exposure
 stupefy
 foreign
 classify
 religious
 specifically
 surveyor
 superintendent
 preference
 qualification
 memorial
 populous
 superiority
 ceremonial
 attorney
 precedent
 political
 foliage
 courtesy
 vengeance
 volcano
 Roosevelt

accessible
 ventilation
 cauliflower
 prevalence
 reviling
 feasible
 outrageous
 summarize
 balance
 blasphemous
 banana
 aqueduct
 apparel
 serviceable
 resurrection
 brigand
 charade
 remnant
 harassed
 Annapolis
 veteran
 challenge
 telephone
 merino
 dimension
 listen
 diamond
 capricious
 massacre
 viciousness
 suitable
 apparition
 coquette
 budget
 handkerchief
 cucumber
 nuisance
 genuine
 cushion
 privilege
 covetous

continual
 memory
 inhabitants
 telescope
 similarly
 faculties
 possession
 mutual
 provocation
 fatigue
 luncheon
 awkward
 camphor
 architect
 obsolete
 August
 ruffian
 discovery
 Jerusalem
 placard
 psalm
 epistle
 hostile
 statesman
 particular
 separated
 triumph
 beginning
 noisome
 conscience
 forsook
 minute
 complexion
 domestic
 irritable
 chapel
 literature
 radiate
 endeavor
 emptiness
 palace

miracle
 subtraction
 pronunciation
 profession
 serious
 synthetic
 psychology
 scheme
 unique
 function
 controlled
 impediment
 dining
 emphasis
 unusual
 position
 potatoes
 besieging
 telegraph
 individual
 accident
 definite
 umbrella
 objectionable
 naphtha
 assessed
 camera
 despair
 tendency
 foresight
 brilliant
 discipline
 juvenile
 beneficial
 development
 operation
 concrete
 curriculum
 acquisition
 drudgery
 syllable

chariot
element
general
orthography
answer
charitable
advisability
president
reciprocity
mechanical
approval
qualified
deceiving
simultaneous
burglar
jubilant
avalanche
reversal
indefensible
conspiracy
episode
perilous
irreverence
strategy
appetite
contestant
exaggerate
balsam
liquidation
echoes
eligible
admitted
irritation
abundant
taste
canceled
brilliance
cartilage
acquiesce
carriage
automobile

hypocrite
persuasive
Binghamton
magazine
enthusiasm
specialize
tendencies
sympathetic
pedagogical
solemn
investigate
service
different
variety
elevator
conceited
clever
evaporate
plateau
cylinder
parricide
advantageous
totem
etiquette
Michael
musician
drowsy
cereal
indispensable
signaling
predecessor
repentant
barrier
substantial
canvassed
weird
independence
intelligent
justice
library
maintain

occurring	military
grammar	murmur
bouquet	necessary
concentric	opportunity
chieftain	patient
scholastic	perspiration
miraculous	possibility
equipped	procession
forfeited	recollect
attendant	reference
collision	secretary
weapon	violin
ferocious	customer
outrageous	chorus
reliance	chief
incorrigible	academy
annulled	accuracy
illusion	agitate
physician	apologize
cessation	ascertain
suspense	behavior
forbidding	confidence
permanent	courageous
supremacy	digestible
raisin	forcible
fallacious	hospital
Morocco	illustrious
signature	dialogue
conscientious	description
irrevocable	studying
defiant	imitation
reciprocity	whatever
arbitration	coherence
benefited	opposite
perjure	excellent
criminal	already
innocence	peculiarities
indulgence	candlesticks
commendable	wholesome
indignant	graphically
refer	spinning

referring
exorbitant
curative
verbatim
parasite
compel
compelled
proposal
millinery
stepped
mercantile
refitted
tanned
tunnel
irresistible
typical
hating
armful
reservoir
mismanagement
arrangement—
choir
treasury
penetrated
sovereign
separation
announced
militia
magistrates
theological
tyrannical
independent
erratic
alliance
drought
handicap
vener
auxiliary
tragedy
paralyzing
weapons

maintained
assumption
accurately
descendants
allegiance
colonizing
henceforth
accession
inhabitants
characteristics
approximately
indentured
frontier
immemorial
confectionery
mischievous
laboratory
insensible
lucid
nominative
unparalleled
occurrence
disappointed
ivory
grandeur
unconscious
languid
tyranny
villagers
emerald
biscuit
courteous
immutable
covenant
suicide
notable
hindrance
idolize
survival
villain
menace

village
glimpse
sergeant
imperative
caught
reluctance
correspond
extremely
purchase
ultimatum
famine

plague
bachelor
version
offensive
responsive
ascension
accessory
quotient
Oneida
plaintiff
subpcena

958

SPELLING.

Grade 2.

Words Used in Regents Examinations, Teachers
Examinations and New York State and
United States Civil Service
Examinations for

GUARDS, OFFICERS, MESSENGERS, ETC.

January	mechanic
statute	laborer
Wednesday	compete
judgment	liquor
salary	evening
Onondaga	beneath
motion	flaming
careful	lingered
decision	heights
message	marble
usual	people
business	delighting
profit	blazing
telegram	carriages
certify	women
nation	laughing
occupy	gaze
amount	laid
Syracuse	English
compel	different
official	spare
Illinois	strength
possess	reputation
plaintiff	peasants
damage	galleries

balance
easily
annual
writing
Tuesday
criminal
manner
guard
either
summons
fuel
similar
figure
several
direct
complaint
answer
adjourn
engine
allowance
justify
machinery
something
habits
savage—
connection
accustomed
boundless
majestic
trackless
mind
striking
formed
nature
simple
fitted
difficulties
privations
soil
kindly
would
penetrate

bathing
really
prisoner
sheriff
arrest
machine
warden
patrol — /
blacksmith
attempt
echo
watch
respect
Saturday
uniform
coal
water
candle
gravel
Rochester
stony
special
Buffalo
prison
letter
Hudson
rifle
clothing
cell
warrant
cover
supply
soldier —
river
keeper
expect
platform
stairs
preacher
commit
offend
Andrew

proud	finger
habitual	exchange
which	momentous
observation	beat
character	gnaw
American	offensive
taken	dinner
scenery	noisy
range	kidnapper
forests	Champlain
rivers	fellow
plains	lettuce
sublime	drizzle
wilderness	basement
desert	gunpowder
stern	freight
enduring	meat
grapple	Samson
support	giddy
little	obstacle
heart	cheek
virtues	phlegm
trouble	berth
through	palm--
linked	fatness
convict	pier
obey	anarchy
wrong	random
civil	empress
adopt	sound
officer	cause
neglect	repealed
repose	leisure
keeper	condition
relative	lease
escape	classical
uniform	organize
convey	drilled
instruct	central
educate	object
nerve	permission
condemn	cataract

prevent	Greenland
refrain	peer
permit	dough
ration	meet
secure	friendship
alarm	stile
safety	Esther
vigilant	passport
services	fossil
weapon	city
greatest	twilight
observe	appreciate
deputy	thirty
citizen	fatten
perform	descent
presence	husband
language	vegetable
humane	Japanese
medicine	indite
hospital	censure
inquire	lesson
physican	razor
physical	laugh
occur	treasury
strictly	purse
standard	expose
chorus	tend
family	promote
learning	welfare
domestic	happier
around	benefit
circle	conceal
none	measure
things	tradition
gives	release
produce	classify
poverty	recognize
want	control
cursing	specify
tears	phrase
death	sanction
asked	system

egg	immense
scorpion	governor
established	dogmatic
source	absolutely
beggary	intense
wretchedness	college
necessarily	profession
increase	breath
burdens	indict
taxes	Egyptian
community	proclaim
overflowing	affix
fountain	goat
every	dancing
bound	lathe
pursue	nourish
such	beet
render	plead
valuable	goodness
consideration	charity
receives	lessen
others	roof
trade	style
avails	dropsy
industry	penknife
obligation	asthma
restore	management
real	constrain
value	sinew
fruit	iron
toil	traitor
himself	equitable
common	year
equity	birth
requires	imagine
return	wedge
thus	Montpelier
merchant	delicacy
farmer	temperance
exchange	popular
growth	meadow
Lincoln	overrun

productions	sulphur
February	dandelion
manufacturer	scarred
written	consider
witness	complete
disappoint	crying
promise	conscience
advertisement	together
publish	farewell
engraving	minstrel
surround	feud
pleasure	valiant
article	valley
needful	mention
comfort	adjacent
agriculturist	remember
result	pleasing
professional	cupboard
skill	generally
Garfield	bashful
these	design
are	oblige
fair	chairman
honorable	appoint
subjects	Oregon
they	factor
mutual	hostess
accommodation	authentic
Europe	index
advance	camera
interest	believe
both	mileage
parties	unravel
with	error
dealer	thistle
ardent	superintendent
spirits	Chicago
obtains	courier
property	muscle
what	suggestion
does	

GRAMMAR.

1. Write sentences containing the following: *a)* **an** interrogative pronoun in the possessive case; *b)* **the** relative pronoun *who* in the objective case; *c)* **where** introducing an adjective clause; *d)* **where** used as an interrogative adverb.

Ans. *a)* *Whose* book have you? *b)* I saw the gentleman to *whom* I sent the letter. *c)* On the very spot *where* we now stand an oak tree once stood. *d)* *Where* did you find the book?

2. Make all corrections necessary in the following sentences and give the reason for each correction: *a)* I am sure it could not have been them. *b)* What sounds have each of the vowels? *c)* She was not wiser than you or I. *d)* He was more active than any other of his companions. *e)* The lowest mechanic, as well as the richest citizens, are here protected in their rights.

Ans. *a)* *Them* should be *they*, because the predicate nominative is required after a form of *be*. *b)* *Have* should be *has*, because *each*, the subject of the sentence, requires a singular verb. *c)* *Is* correct. *d)* *Other* should be omitted because he is not his own companion. *e)* *Are* should be *is* and *their*, *his*, in order to agree in number with *mechanic*, the subject of *are* and antecedent of *their*.

3. When should the comparative degree of adjectives be used? When, the superlative? Give an example of each in a sentence.

Ans. The comparative degree of adjectives should be used in representing a quality as belonging to *one of two* objects in a higher (or less) degree than to the other; the superlative, in representing a quality as belonging to *one of several* objects in the highest (or lowest) degree. New York is *larger* (comparative) than any other city in the United States, but London is *the largest* (superlative) city in the world.

4-5. Illustrate in sentences a conditional clause whose verb is *a)* in the indicative mode; *b)* in the subjunctive mode. Explain the use of each mode as used in these conditional clauses.

Ans. *a)* "If it rains, why do you go?" The raining is assumed as a fact. A conditional clause has its verb in the indicative mode when the action is assumed as a fact or when the uncertainty lies merely in the speaker's knowledge of the fact. *b)* "If it rain tomorrow, the work may be delayed." The raining is thought of as a mere contingency; something that may or may not happen. "If my friend were here, he would enjoy this." He is not here—the condition is unreal; so use the subjunctive mode. A conditional clause has its verb in the subjunctive mode when the action is considered as merely possible, or when the speaker is certain that it is not true.—*Reed and Kellog.*

6. Give an example in a sentence, of *that* used as *a)* an adjective; *b)* a pronoun; *c)* a conjunction.

Ans. *a)* *That* book is the one I need. *b)* I have the book *that* I need. *c)* I hope *that* you will succeed.

7. Illustrate by sentence or sentences a participle used *a)* as a noun; *b)* as an adjective.

Ans. *a)* Good *reading* aloud is an accomplishment. *b)* The children, *coming* home from school, look in at the open door.

8. As relative pronouns have no variation in form except to indicate case, what determines the person and number of ~~a~~ verb whose subject is a relative pronoun?

Ans. The antecedent of the relative pronoun. ✓

9. How may an adjective clause be distinguished from an adverbial?

Ans. Adjective clauses modify nouns or pronouns. Adverb clauses modify verbs, adjectives or adverbs.

10. Write a sentence containing *a)* a word used as a common noun which is usually a proper noun; *b)* a word used as a proper noun which is usually a common noun.

Ans. a) He was the napoleon of Wall street. b) Oh, Death! where is thy sting?

11. Give an example of a) a participle and b) a clause, each used as the subject of a finite verb.

Ans. a) Running is good exercise. b) That the world is round is believed by all.

12. Name three uses of the nominative case and write a sentence to illustrate each. (Underline each example.)

Ans. 1) The *subject* or 2) the *attribute* of a sentence, 3) a word in apposition with another nominative, 4) a noun used in direct address, or 5) a noun used independently is in the nominative case. My *brother* (1), *John* (3), is the *author* (2) of the book. *Gentlemen* (4), let us remember this. The *bird* (5) having escaped, we put away the cage.

13. State how the following forms of the verb are made: the progressive, the emphatic, the passive. Illustrate each form.

Ans. The progressive form of a verb is made, in the active voice, by adding to the different forms of the verb *be* the present participle of the given verb; and in the passive voice by adding to the different forms of the verb *be*, the present participle of *be* and then the perfect participle of the given verb. The boy *is writing* the letter. The letter *is being written*. An emphatic form of the present and past tense indicative and of the imperative is made by prefixing some form of *do* or *did* to the present form of the verb. He *does write*. He *did write*. *Do write*. The passive form of a transitive verb is made by joining its perfect participle to the different forms of the verb *be*. The letter *has been written*.

14. Define adjective. Name and discuss the sub-classes.

Ans. a) A word used to limit or qualify a noun.

b) Limiting adjectives modify the noun without expressing any quality.

Qualifying adjectives modify the noun by naming some quality.

15. Define clause. Name kinds of dependent clauses and write sentences illustrating them.

Ans. a) A subordinate portion of a sentence containing a subject and a predicate.

b) *Adjective*, John *who struck him* has gone.

Subject, Know *thyself* is an old maxim.

Predicate, The truth is *all men are not born equal*.

Object, I know *some men are grateful*.

Adverbial, I shall not come *because he will be there*.

16. Define voice. Write a sentence in active voice; then change it to passive voice, and describe the change that takes place in syntax.

Ans. a) The modification of a transitive verb which indicates the relation of the subject of the verb to the action which that verb expresses.

b) *Active*, He struck me.

Passive, I was struck by him.

The doer of the action, who is the subject in the active voice, becomes the object of the preposition *by* in the passive form. The verb is affected by the corresponding tense-form of the auxiliary *to be* and the receiver of the action changes from the objective to the nominative case-form and becomes the subject of the sentence in the passive form.

17. Write sentences illustrating the reflexive and emphatic use of pronouns.

Ans. I blame *myself* for the mistake.

You *yourself* told me the story.

18. What determines the case of a noun?

Ans. The case of a noun is determined by its use in the sentence.

John has studied his *lesson*.

John is in the nominative case, *lesson* is in the objective case.

He borrowed *Mary's* book.

Mary's is in the possessive case.

John, be quiet.

John is in the nominative absolute case.

19. Use an infinitive as a noun; an adjective; an adverb.

Ans. I like *to recite* (noun).

We believe in the life *to come* (adjective).

We study *to learn* (adverb).

20. Write a sentence containing a clause used as object of a) a verb; b) a preposition.

Ans. a) I know *that he has come*. b) The result depends on *who is to be the judge*.

21. Write a sentence containing a) an infinitive used without *to*; b) a participle used as the object of a preposition.

Ans. a) He dared not *leave* the place. b) Success generally depends on *acting* prudently, steadily and vigorously.

22. Illustrate by sentences the use of *that* as a) an adjective; b) a relative pronoun; c) a conjunction.

Ans. a) *That* book is a grammar. b) The book *that* you have is a grammar. c) I hope *that* you will be successful.

23. Give all the singular and plural forms of the following: news, chrysalis, analysis, solo, peas, foci, phenomena, pennies, genius, politics.

Ans. Singular nominative. Plural nominative.

news	
chrysalis	chrysalides or chrysales
analysis	analyses
solo	solos or soli
pea	peas or pease
focus	foci or focusēs
phenomenon	phenomena
penny	pennies or pence
genius	geniuses or genii
	politics

24. Write a sentence whose predicate has as attribute a) a pronoun; b) a clause; c) an infinitive.

Ans. a) It is *he*. b) Things are not always *what they seem*. c) To learn the art of being content is *to realize* a chief condition of our being happy.

25. Give the syntax of the nouns in the following sentences: "He remained a month." "They believed the crime to be a felony."

Ans. *Month* is objective case. Some grammarians call it "an adverbial objective," i. e., a noun in the objective case used adverbially (having the force of an adverb or adverbial phrase), others say it is the object of a preposition understood. *Crime* is objective case, the subject of the infinitive *to be*. *Felony* is objective

case, a "predicate objective" of the infinitive *to be*; a predicate objective is in the same case as the subject of its verb.

26. Give an example in sentences of a clause used as a) a subject; b) an object of a verb; c) an object of a preposition.

Ans. a) *That he is honest* is shown by this. b) We know *what master laid thy keel, what workmen wrought thy ribs of steel.* c) He was in earnest in *whatever he undertook.*

27. Write a sentence using some form of the verb *be* in a conditional clause, a) in the subjunctive mode; b) in the indicative mode. Explain the difference in meaning between the two modes as used.

Ans. a) If the earth *were* flat, men could not sail around it. b) If the earth *is* round, men can sail around it. In *b* the verb is indicative because the condition is regarded as true. In *a* the verb is subjunctive because the condition is merely assumed.

28. Write a sentence containing a) an appositive; b) a predicate noun (attribute).

Ans. Examples: a) The statement, *that all men are created equal*, was made by Thomas Jefferson. b) It is *what I desired.*

29. Give an example of a clause used as a) subject of a finite verb; b) as object of a preposition.

Ans. Examples: a) *That all men are created equal* is evident. b) The success of the school depends upon *who is principal.*

30. Give an example in a sentence of an appositive which is a) a noun; b) a pronoun; c) a clause; d) an infinitive.

Ans. a) Longfellow, the *poet*, was much beloved. b) He, *himself*, shall judge. c) The news *that our troops were victorious* cheered all hearts. d) It is your duty *to obey* the rules. (In appos. with *it*.)

31. Give the second person singular of the verb *go* in the present tense of all possible modes.

Ans. Indicative, thou goest; potential, thou mayst go; subjunctive, if thou go; imperative, go thou.

32. Give the syntax of the nouns in the following sentence: "The rain over, we ventured out." "Ye crags and peaks, I'm with you once again." "He was made captain."

Ans. *Rain* is nominative case, used independently; *crags* and *peaks* are nominative, used in address; *captain* is nominative, used as attribute complement.

33. State the law of formation of *a*) the progressive form of the verb, *b*) the past perfect tense. What are the principal parts of verbs? Why are they so called?

Ans. *a*) By combining the present participle of the verb with some form of the verb to be. *b*) By combining the past participle of the verb with had. *c*) Present tense, past tense, present and past participles. *d*) Because all other parts are formed from these.

34. How is the passive voice of the verb formed? Illustrate by example.

Ans. By combining some form of the verb *to be* with the past participle of a transitive verb. The boys *broke* the glass. The glass *was broken* by the boys. *Was broken* is past tense of *be* and past participle of transitive verb *break*.

35. Which three parts of speech may connect clauses? Give in sentences an example of each so used.

Ans. *a*) Conjunction: His legions defeated the Caledonians *and* his fleets displayed the Roman arms on all seas.

b) Pronoun: His legions *which* were commanded by Agricola defeated the Caledonians.

c) Adverb: The Caledonians were defeated *when* they met the legions of Agricola.

36. Define and give an example in a sentence of *a*) an abstract noun; *b*) a collective noun.

Ans. *a*) A common noun that names a quality, an action, a feeling, a condition, is called an abstract noun. "The doorstep to the temple of *wisdom* is a *knowledge* of our own *ignorance*."

b) A common noun that denotes a group or class made up of objects of the same kind is called a **collective**.

noun. "Agricola defeated the Caledonians with his fleet and one legion."

37. Distinguish subordinate conjunction and conjunctive adverb. Illustrate by sentences.

Ans. A subordinate conjunction simply joins a subordinate clause and a principal clause. It does not modify and is not a part of either clause. A conjunctive adverb joins a subordinate clause to some word or some part of the principal clause, is a part of the subordinate clause, and modifies some verb, adjective or adverb, in the subordinate clause. Subordinate conjunctions: I shall not go *until* you arrive. The teacher explained the sentence *after* I read it. Conjunctive adverbs: The leaves fall *when* frost comes. The tree is *as* high *as* the house.

38. Write three sentences containing examples respectively of: a) Substantive clause; b) adjective clause; c) adverbial clause.

Ans. a) That this is a cold day needs no proof. b) The lecturer whom we heard last night is from Boston. c) The merchant will cash the check whenever you take it to him.

39. Use an infinitive: a) as the subject of a verb; b) as the object of a verb; c) as the complement of a copulative verb; d) as an adjective; e) as an adverb.

Ans. a) To fall is not always a disgrace. b) I want to read. c) The dark cloud seemed to expand. d) This is an occasion to be remembered. e) All should eat to live.

40. Distinguish by definition and example the modes and voices of verbs.

Ans. The indicative mode is used in asserting a fact, in expressing a supposition as a fact, and in asking a question; as, The sun shines. If he was sick he should be excused. Has the train come?

The subjunctive mode expresses doubt, or denial, or something merely thought of as a possibility; as, If he be honest, he will pay his debts. If I were you, I would not go.

The imperative mode expresses a command, an exhortation, a request, or an entreaty; as, Come with us.

The potential mode expresses power, duty, obligation, or necessity; as, John should go. We cannot lift the log.

The infinitive mode expresses action, being, or state without affirming it; as, We should try to come before the hour.

The active voice represents the subject of the verb as acting; as, The cat caught a bird.

The passive voice represents the subject of the verb as acted upon; as, The poem has been published.

41. By forming sentences illustrate the correct use of the verbs, *write, take, do, sit, see, give, lay, throw*, each in the past or past perfect tense.

Ans. Scott wrote many books. Ralph had taken his sled home. They did the work. The boys sat still more than an hour. I had seen him long before. John had given eighty dollars for the horse. She laid the book on the table. George threw the ball out of sight.

42. Give three rules for the use of capital letters and illustrate each.

Ans. Every name for the Deity should begin with a capital; as God, Christ.

Every proper name should begin with a capital; as, Charles, Baltimore.

Words derived from proper names should begin with capitals; as, American, Russian.

43. Illustrate the use of *a)* an infinitive as an appositive; *b)* a participle as the object of a preposition.

Ans. *a)* "To be, or not to be, that is the question." It is useless to worry. *b)* We acquire concentration by studying.

44. Give an example of *a)* a noun used independently before a participle; *b)* a participle used as the object of a preposition and yet taking an object.

Ans. *a)* The bridge giving way, we were thrown into the river. *b)* By reading the classics, we acquire a good vocabulary.

45. Illustrate the use of *a)* an infinitive as attribute (like a predicate noun); *b)* a clause as attribute.

Ans. *a)* To be truthful is to be honest. *b)* Man seldom is what he pretends to be.

46. Give a synopsis of the verb *lie* (to recline) third person singular in all the tenses of the indicative mode.

Ans. Pres., *he (she or it) lies*; past, *he lay*; fut., *he will lie*; pres. perf., *he has lain*; past perf., *he had lain*; fut. perf., *he will have lain*.

47. a) Without changing the sense, recast the clause, "Where the commissariat necessities alone would have broken down any transportation system of Europe," by changing the verb to the passive voice. b) State how a verb of the active voice is changed to the corresponding form of the passive voice.

Ans. a) Where any transportation system of Europe would have been broken down by the commissariat necessities alone. b) Change the verb to the corresponding form of the verb *be* and add the perfect participle.

48. Write sentences using *but* as three different parts of speech and name each.

Ans. As conjunction: He gained the victory *but* lost his life. As adverb: We meet *but* to part. As preposition: All were there *but* him.

49. a) State how compound personal pronouns are formed. b) Name and illustrate in sentences two uses of these pronouns.

Ans. a) Add *self* to the singular and *selves* to the plural of the first form of the possessive case of the 1st and 2nd persons and to the objective case of the 3rd person of the simple personal pronouns. b) (1) For emphasis: I *myself* saw him do it. (2) As reflexives, to turn the action of the verb back upon the actor: The mind cannot see *itself*.

50. Give examples in sentences of three infinitives, each having a different grammatical use, and give the syntax of each.

Ans. 1) We will strive *to please* you. Used adverbially to modify the predicate *will strive*. 2) We should learn *to govern* ourselves. Used as object of the verb *should learn*. 3) There is a time *to laugh*. Used adjectively to modify *time*.

51. Write sentences containing a) a proper noun used as the object of an infinitive, b) the comparative of *ill*, c) the compound personal pronoun in the third person plural, d) an infinitive used as the object of a verb, e) a subordinate conjunction.

Ans. a) Attempts to assassinate William the Silent were defeated. b) The child who was ill yesterday is worse to-day. c) The boys will hurt themselves if they are not careful. d) I forgot to mail the letter. e) If you knew my fault you would reprove me.

52. Combine the following statements into a complex sentence containing but one subordinate clause:

I had climbed the hill. I had set up my rifle against a tree. I began picking berries. I was lured on from bush to bush. I was lured by the black gleam of fruit.

Ans. Having climbed the hill and set up my rifle against a tree, I commenced picking the berries whose black gleam lured me on from bush to bush.

53. Classify the following sentences as to form and as to use (meaning): a) What a charming pose when she lifted her head, and turned it to regard her child! b) The liquid is of course thicker and sweeter, and will bear diluting. c) As she approached Slide Brook, she saw a boy standing by a tree, with a raised rifle. d) What shall be said of the army which has so nobly relieved them of the terror of the deer? e) She took a step; she turned her head to the south; she listened intently.

Ans. a) Complex, exclamatory; b) Simple, declarative; c) Complex, declarative; d) Complex, interrogative; e) Compound, declarative.

54. Give the part of speech and the syntax of *each* of the italicized words in the following: a) His haunch is as tender as his *heart*, b) It is rare to find *anything natural* and unstudied, c) If the little spotted fawn *can* think, it must seem to her a queer *world*, d) The hunters haul them away to market, until the enclosure is *pretty* much emptied, e) He may find himself climbing an almost inaccessible *cliff*.

Ans. *Heart* is a common noun, nominative case, subject of the verb *is tender* understood. *Natural* is a descriptive adjective, objective complement to complete the infinitive *to find* and to modify the object complement *anything*. *World* is a common noun, nominative case, predicate nominative to complete the predicate verb *must seem*. *Pretty* is an adverb of degree, modi-

fies the adverb *much*. *Cliff* is a common noun, objective case, object of the participle *climbing*.

55. More helpful than all wisdom or counsel is one draught of simple human pity that will not forsake us.
— *George Eliot*.

a) Give the subject and predicate of the principal clause of the above sentence. Give the modifiers of b) the subject, and c) the predicate. d) Do the same with each subordinate clause. e) Give syntax of *counsel*.

Ans. a) Subject, draught; predicate, is (helpful), b) one, adjective; of pity, phrase. c) Helpful, attribute comp. mod. by adj. *more*; more, mod. by clause, than all wisdom or counsel (is helpful). d) Sub. clause — that will forsake us — that, subject, unmodified; will forsake, predicate modified by direct object *us*, and not, advb. wisdom or counsel, sub. clause; wisdom or counsel, comp. subj. mod. by *all*; predicate (is helpful) understood. e) Counsel: subject of *is* understood.

56. Illustrate in sentences: a) An objective predicate. b) A cognate object.

Ans. a) They chose him secretary. b) He lived a blameless life.

57. Define principal, subordinate and independent elements. Give sentences to illustrate.

Ans. A principal element is the subject or predicate. *Flowers bloom.* A subordinate element is one used as a modifier. *Flowers bloom annually.* An independent element is one having no grammatical connection with the rest of the sentence. "*Great Cæsar! How you frightened me.*"

58. What classes of nouns have no plurals?

Ans. Most nouns denoting materials, names of arts, sciences and diseases.

59. Mention three ways of distinguishing gender in nouns, and illustrate.

Ans. By terminations, *lion, lioness*; by different words, *boy, girl*; by parts of compound words, *man-servant, maid-servant*.

60. How are adverbs classified with respect to meaning?

Ans. Time, *then*; place, *there*; manner, *swiftly*; cause, *why*; degree, *how*; intensity, *only*.

61. Correct the following sentences and give the reason for each correction:

- a) Here is the egg that was lain by the speckled hen.
- b) Mother will not let me go without it stops raining.
- c) Come in and set awhile, neighbor.
- d) He don't know who it is.
- e) The oldest daughter married a banker whom they say is very wealthy.

Ans. a) Here is the egg that was laid by the speckled hen. "Lie," to rest, being intr., has no passive form. b) Mother will not let me go unless it stops raining. "Without" is a prep., "unless," a subord. connective is required. c) Come in and sit awhile. "Set" (to place) is trans. It should be the intr. verb. "sit," to rest. d) He does not know who it is. "Don't" is a corruption of do and not. "Do" should be "does," 3rd, sing. e) The oldest daughter married a banker who, they say, is very wealthy. "Whom," the obj. case, should be "who," the nom. case, subj. of "is."

62. Make a complex sentence of the following:

I pursued my walk. I pursued it to a door. The door was arched. It opened. It opened on the interior of the abbey.

Ans. I pursued my walk to an arched door, which opened on the interior of the abbey.

63. a) What parts of a verb are principal parts, and why are they so named? b) How are the principal parts of a regular (weak) verb formed? Give an example.

Ans. Pres. Ind., Past Ind., Pres. Participle, Past Participle; so called because the parts from which the others are derived. By adding "ed" to past tense and past part. Love, loved, loving, loved.

64. Give of the verb *seek* a) the perfect passive participle, b) the present progressive participle, c) the past participle, d) the perfect active infinitive, e) the present passive infinitive.

Ans. a) Having been sought; b) being seeking; c) sought; d) to have sought; e) to be sought.

65. In the following sentence change *a)* the participial phrase into an adjective clause, *b)* the infinitive phrase into a noun clause, *c)* the prepositional phrase into an adverbial clause: The boy, seeing the bear, thought to shoot him, but trembled so from fright that he could not take aim.

Write in the passive in *two* ways the sentence, *I asked him a question*, changing in each case the subject but not the meaning of the sentence.

Ans. *a)* The boy who saw the bear thought he would shoot him, but he could not take aim, because he was so frightened that he trembled. *b)* A question was asked of him by me. He was asked a question by me.

66. Write original sentences illustrating the use of *above* as *a)* an adverb, *b)* a preposition; *what* as *a)* an adjective, *b)* a pronoun.

Ans. *a)* The captain went *above* to observe the weather. *b)* The trees lift their branches *above* the heads of the people who pass below on the pavement. *a)* *What* day was the exhibition to be held? *b)* *What* is it?

67. Give the part of speech and the syntax of *each* of the italicized words in the following: *a)* Its little body was hot and *panting* in my hands, *b)* Certain birds *nest* in the vicinity of our houses, *c)* Weasels might have robbed the nest, *as* they sometimes climb trees, *d)* The birds were *much* disturbed by the event, *e)* He is seized with an *itching* for a collection of eggs and birds.

Ans. *a)* *Panting* is a participle used as the attribute of "was." *b)* *Nest* is a verb used as predicate. *c)* *As* is a conjunctive adverb; it connects "weasel might have robbed" and "they climb." *d)* *Much* is an adverb modifying "were disturbed." *e)* *Itching* is a participle used as the principal word after "with."

68. Write a compound sentence containing one complex member; a complex sentence containing an infinitive phrase; an imperative sentence and change it to an interrogative sentence.

Ans. War has ceased and peace has come to those who fight.

He who is afraid to tell the truth is a coward.

Shut the door.

Why do you not shut the door?

69. Analyze by diagram or otherwise the following sentence: The veteran regiments of the English army which were now sent across the Atlantic would have scorned to fight under the orders of an old American merchant.

Ans. Complex declarative sentence: Principal clause, The veteran regiments of the English would have scorned to fight under the orders of an old American merchant; dep. clause, which were now sent across the Atlantic; rel. pron., which.

70. Write the meaning of *each* of the following abbreviations: D. D., inst., e. g., B. C., lbs., vs., etc., pwt., Rev., obs.

Ans. D. D., Doctor of Divinity; inst., instant, the present month; e. g. (*exempli gratia*), for example; B. C., before Christ; lbs., pounds weight; vs., versus, against; etc., and so forth; pwt., pennyweight; Rev., reverend; obs., obsolete or observation.

71. Form a word from *each* of the following stems: *dict, ced, mult, duc, spec.* Write sentences in which the words formed are correctly used.

Ans. Dict, contradict; ced, antecedent; mult, multitude; duc, conduct; spec, specimen.

When I spoke he contradicted me. My antecedents were Puritans. The multitude shouted as of one voice. His conduct is always that of a gentleman. I have mounted on cardboard all of my botanical specimens.

72. Define a phrase. Write sentences illustrating a substantive phrase; an adjective phrase; and adverb phrase.

Ans. A phrase is a group of related words, not having a subject or predicate, used to fill the office of a part of speech. — *Sisk.*

Playing tennis is delightful. He is a man of *prominence*. Please let me go *with you*.

73. Point out how many clauses, what kind, and how related, in the following: "There are some thinkers

about whom we always feel easy, because they never have a thought of sufficient magnitude to be made uncomfortable by its possession."

Ans. a) Three clauses.

b) *Principal* — "Some thinkers are."

Adjective — "About * * * easy," modifies "thinkers."

Adverbial — "because * * * possession," modifies "feel easy," predicate of adjective clause.

74. Analyze: They elected him president.

Ans. "They elected him president." This is a simple declarative sentence; "They" is the subject; "elected him president" is the complete predicate; "elected," the verb, is modified by "him," a direct object, and also by "president," a complementary object.

75. "He did not seem so much desirous of provoking discussion by the questions he asked, as of obtaining information at any rate." a) Give construction of *desirous*, *as*, *provoking*, *information*. b) What is the direct object of *asked*?

Ans. a) *Desirous*, predicate adjective of "did seem."

As, correlative connective of "so."

Provoking, participle used as noun, object preposition "of."

Information, noun objective case, object of participle "obtaining."

b) "Which" understood.

76. What determines the part of speech of a word? Illustrate by using *like* as two parts of speech.

Ans. The function, or use of a word in a sentence, determines the part of speech to which it belongs. How do you *like* your new home? "Be strong and quit yourselves *like* men."

77. Classify modifiers.

<i>Ans.</i> Modifiers.	{	substantive..	{	appositive
				possessive
				objective
				adjective
				adverbial
{	attributive..	{		

78. Write a sentence containing a substantive clause used as a subject; as object of verb.

Ans. That he is a teacher is evident. He said "I **am** ready to go."

79. Write the singular and plural forms of the following: Genus, larva, apex, axis, genius, focus, thesis, alumnus.

Ans. Genus, genera; larva, larvae; apex, apexes, or apices; axis, axes; genius, geniuses; focus, foci; thesis, theses; alumnus, alumni.

80. Punctuate and capitalize the following:

a still small voice spake unto me
thou art so full of misery
were it not better not to be

Ans. A still small voice spake unto me,
"Thou art so full of misery,
Were it not better not to be?"

81. Define *co-ordinate conjunction*, *intransitive verb*, *numeral adjective*, *auxiliary verb*, *clause*. Write sentences illustrating each.

Ans. For principal parts of speech and definitions see any English grammar. *a)* "Law wears iron shoes, and cares not where it steps: "And" a co-ordinate conjunction. *b)* "In sorrow sweetest things will grow: "Grow" is an intransitive verb. *c)* There are three verb-phrases that must be studied: "Three" is a numeral adjective. *d)* The boy has learned his lessons well to-day: "Has" is the auxiliary or helping verb. *e)* Have you learned when the steamer will sail? "When the steamer will sail" is a clause.

82. Form words from the stems *curr*, *loc*, *lect*, *loqu*, *duc*, and write sentences in which these words are properly used.

Ans. Curr — run — current. The current of the river is swift. Loc — place — locate. Locate the towns. Lect — gather — collect. Collect the money. Loqu — talk — loquacious. The man was very loquacious. Duc — lead — conductor. He is the conductor of the orchestra.

83. Write sentences containing *a)* an adjective clause, *b)* a present passive infinitive, *c)* a noun clause used as object, *d)* a past participle, *e)* a perfect active infinitive.

Ans. a) The woman who is leading the child is very poor. "Who is leading the child" is an adj. clause. b) Is the exercise to be written in ink? "To be written" is a pres. passive infinitive. c) Did he think how quickly the enemy would discover him? "How quickly the enemy would discover him" is a noun clause as an object. d) The child known to us all is dead. "Known" is a past participle. e) The general was to have led his army through the valley. "To have led" is the perfect active infinitive.

84. Write sentences illustrating the use of *few* as a) an adjective, b) an adjective pronoun (indefinite pronoun); *that* as a) an adjective, b) a relative pronoun; *well* as a) an adjective, b) an adverb.

Ans. a) A few girls were here. b) A few of us are going. c) That lady is sick. d) The horse that was sick is dead. e) The dog is well. f) The nest is well built.

85. Write original sentences showing the difference between a) a participial adjective and a participle, b) a personal pronoun and an interrogative pronoun, c) an adverb and an adverbial phrase.

Ans. a) The girls sat laughing and talking. I, hearing the music, stopped. b) She is away. What am I to do? c) The girl lives there. We started when we heard you coming.

86. Combine the following statements into a complex sentence:

He had just raised the cup to his lips. His eyes fell on a poor soldier. The soldier was dying. The soldier was looking longingly at the drink. The drink was cool.

Ans. He had just raised the cup to his lips when his eye fell upon a poor dying soldier, who looked longingly at the cool drink.

87. Give the case and government of each noun in the following sentence: America's greatest hope is the young men who still have faith in high ideals.

Ans. "America's" possessive case of hope; "hope" nom. case, subj. of verb "is," "men" nom. case after

95. In the following sentences state which of the two italicized words is correct, and give the reason in each case:

a Neither John nor James (*have, has*) written this letter.

b Every pupil in the school must bring (*his, their*) books.

c That man passes our house (*most, almost*) every day.

d The recipe calls for two cups full, *cupfuls*) of sugar.

e I did not ask to see (*that, those*) kind of cattle.

Ans.... *a*) Neither John nor James has written this letter. Two or more singular antecedents connected by "or" or "nor" require a verb in the singular. *b*) Every pupil in the school must bring his books. When the antecedent is a singular noun modified by "each," "every" or "no," the pronoun must also be singular. *c*) That man passes our door almost every day. "Most" denotes the highest number, quantity or degree, and is always superlative. Almost means *nearly*. *d*) The recipe calls for two cupfuls of sugar. The same cup filled twice. *e*) I did not ask to see that kind of cattle. Avoid the use of "these" and "those" with a singular noun. "Kind" is in the singular number.

96. Form a word from *each* of the following stems: *cent, vid, capt, mitt, dign*. Write sentences in which the words formed are correctly used.

Ans. "*cent*" — centimeter. A *centimeter* is the hundredth part of a meter. "*vid*" — evident. It is *evident* that the boy studies. "*capt*" — capture. The policeman will *capture* the thief. "*mitt*" — committing. The mother bids her soldier boy farewell, *committing* him to God. "*dign*" — The judge ruled with *dignity*.

97. Write the feminine of *lord, earl, tiger*; the possessive singular of *enemy, sheep, son-in-law*; the possessive plural of *knife, child, mouse, Englishman*.

Ans. Lady, countess, tigress; enemy's, sheep's, son-in-law's; knives', children's, mice's, Englishmen's.

98. Write the past (imperfect) and the past perfect (pluperfect) indicative, active, first singular of *each* of the following verbs: see, lay, do, go, *bring*.

Ans. I saw, I had seen. I lay, I had lain (Intrans.): I laid, I had laid (Trans.). I did, I had done. I went, I had gone. I brought, I had brought.

99. Write sentences containing *a)* a collective noun, *b)* a compound personal pronoun, *c)* a past (perfect) participle modifying a noun, *d)* an adverb of time, *e)* an infinitive phrase.

Ans. *a)* The *army* was disbanded peacefully. *b)* Did not the witness perjure *himself*? *c)* A penny *given* willingly is of greater value than a pound *given* grudgingly. *d)* The ambitious pupil will always be *early* at school. *e)* We should try to do *what is right*.

100. Correct the following sentences and give the reason for each correction: *a)* His failure lays in himself, *b)* Which seat is the best, this seat or that seat, *c)* The rose smells sweetly, *d)* Whom did you say it was? *e)* This is between you and I.

Ans. *a)* His failure *lies* in himself. "Lay" is transitive. Should be the intransitive verb "lie." *b)* Which seat is the *better*, this seat or that seat? When only two objects are compared, the comparative degree should be used. *c)* The rose smells *sweet*. Never use an adverb when a predicate adjective is required. *d)* Who did you say it was? "Whom" is objective; it should be "who" nominative after "was." *e)* This is between you and *me*. "I" is nominative; should be "me," objective of "between."

101. Combine the following sentences into a single sentence that shall contain *two* participial phrases: The fawn had taken his morning meal. He lay curled up on a bed of moss. He watched his mother. He watched her with his large, soft brown eyes.

Ans. The fawn *having taken his morning meal*, lay curled up on a bed of moss, *watching his mother* with his large, soft brown eyes.

102. State the difference between *a)* a phrase and a clause, *b)* a transitive and an intransitive verb, *c)* a subordinate and a coordinate conjunction, *d)* a compound and a complex sentence, *e)* a personal and a relative pronoun.

Ans. a) A *phrase* is a group of related words having neither subject nor predicate. A *clause* is a part of a sentence having a subject and a predicate. b) A *transitive* verb is one that requires an object. An *intransitive* verb is one that does not require an object. c) A sub-ordinate conjunction connects words, phrases and clauses of different rank. A coordinate conjunction connects words, phrases and clauses of the same rank. d) A compound sentence contains two or more independent propositions connected by one or more conjunction. A complex sentence contains one independent proposition and one or more clauses. e) A personal pronoun shows by its form whether it is of the first, the second or the third person, and it also relates to some preceding word or words for its antecedent. A conjunctive or relative pronoun relates to some preceding word or words for its antecedent, and also *connects clauses*.

103. Name the parts of speech used as connectives.

Ans. The conjunction, the relative pronoun, conjunctive adverbs and copulative verbs.

104. Write sentences containing the following: Abstract noun, concrete noun, class noun, collective noun.

Ans. *Virtue* is a noble quality. *Chicago* is a large city. *Peaches* are a fine fruit. We hived a *swarm* of bees.

105. Name two adjectives which change their form when used with nouns plural in meaning.

Ans. *This*, changed to *these*; and *that* changed to *those*.

106. The functions of what different parts of speech may the infinitive fulfill. Illustrate each.

Ans. The infinitive may be used as a) a noun. b) an adjective, c) an adverb. a) See question 10. b) There is much work *to do*. c) See question 10.

107. What is an irregular verb? Give three examples. What is an auxiliary verb? Name the words used as auxiliary verbs.

Ans. An irregular verb does not form its past tense and perfect participle by adding *d* or *ed* to the present indicative, but shows some other change in spelling.

Ex. *sing, run, speak.* Verbs which are employed to aid the principal verb by asserting or expressing the condition of the act or state are called auxiliary verbs. They are; *do, be, have, shall, will, may, can, must.*

108. What is a participial noun? An abstract noun? A collective noun? Give an example of each.

Ans. A participial noun is a participial infinitive or gerund used without any verbal force or construction. Ex.: The *beating* of the carpets caused clouds of dust. An abstract noun is the name of some quality, condition, or relation of objects. Ex.: The *beauty* of the day soon faded. A collective noun is a name applied to an entire group or collection of objects. Ex.: *Herds* of cattle roamed the plains.

109. Distinguish between clause and phrase.

Ans. A clause has a subject and a predicate and a phrase has not.

110. Her brown coat *was just beginning* to be mottled with the beautiful spots which make *this* young creature as *lovely* as the gazelle. Give, from the above quotation, the part of speech and syntax of *just, this, lovely.* Parse *was beginning.*

Ans. "Just" is an adverb, modifies verb "was beginning." "This" is an adjective, limits noun "creature." "Lovely" is an adjective, limits noun "creature." "Was beginning" is a verb. Pres., begin; past, began; pres. part., beginning; past part., begun; irregular, transitive verb; active, progressive; indicative mode; past tense; singular number; third person; predicate of "coat."

111. Write sentences containing the masculine singular of *maid, niece, heroine, goose*; the feminine plural of *lion, monk, boy, drake*; the possessive plural of *king, child.*

Ans. The *lad* was in the woods.
My *nephew* was sick.
The man was a *hero* at the fire.
The *gander* is in the yard.
The *lionesses* escaped from the man.
The *nuns* were in the church.
The *ducks* have gone down the road.
The *girls* are gone home.
The *kings'* houses were burned.
The *children's* mother is away.

112. State the difference between *a)* an adjective and an adverb, *b)* an interrogative pronoun and a relative pronoun, *c)* the active voice and the passive voice, *d)* an exclamatory sentence and an imperative sentence, *e)* a phrase and a clause.

Ans. *a)* An *adjective* is a word used to modify a noun or pronoun; and an *adverb* is used to modify a verb, adjective or another adverb. *b)* An *interrogative pronoun* is a pronoun used to ask a question; and a *relative pronoun* connects clauses and relates to its antecedent. *c)* The *active voice* denotes the subject as the doer of the act; and the *passive voice* denotes the subject as the receiver of the act. *d)* An *exclamatory* sentence is a sentence used to denote excitement or feeling; and an *imperative* sentence is used to give a command. *e)* A *phrase* is a part of a sentence not containing a subject and predicate; and a *clause* does contain a subject and predicate.

113. Make a complex sentence of the following: The deer entered the woods. The woods were thin. The deer saw a rabble of people. The people were starting across the meadow. They were starting in pursuit of the deer.

Ans. The deer entering the thin woods, saw a rabble of people, who were starting across the meadow in pursuit of her.

114. Form *one* word from *each* of the following stems and use each word correctly in a sentence: *sci*, *fact*, *merg*, *pend*, *un*.

Ans. The boy knew the *science* of geography.

Is two a *factor* of four?

The man *submerged* into the water.

Did you *append* the picture to the wall?

The governor was elected *unanimously*.

115. Write sentences illustrating the use of *that* as *a)* a relative pronoun, *b)* a conjunction, *c)* an adjective, *d)* an adjective pronoun (demonstrative pronoun),

Ans. *a)* The boy *that* was here is sick.

b) We eat *that* we may live.

c) *That* girl was in school.

d) *That* is the way to New York.

116. Write sentences using correctly *a)* the interrogative *who*, introducing a subordinate clause, *b)* the relative *who* modifying the object of a preposition, *c)* the interrogative *which* modifying a noun, *d)* the relative pronoun *which*, *e)* *that* introducing an adverbial clause.

Ans. *a)* Who did you say he is? *b)* That is the father of the boy *who* was killed. *c)* Which hat is yours? *d)* This is a thing *which* I ought to do. *e)* He studied *that* he might obtain fame in his profession.

117. Combine the following statements into a complex sentence: The doe reached the timber. She heard the brutes. The brutes were savage. The brutes were howling. The brutes were across the meadow.

Ans. The doe, hearing the savage brutes across the meadow, howling, reached the timber.

118. Write the possessives, singular and plural, of each of the following nouns: *university, calf, hero, goose, fox.*

Ans. Possessive singular: *university's, calf's, hero's, goose's, fox's;* Possessive plural: *universities', calves', heroes', geese's, foxes'.*

119. Give the case and government of each italicized word in the following sentence: I gave *him* a letter for *my friend*, the *attorney*.

Ans. I gave *him* a letter for *my friend*, the *attorney*. "Him," objective case, object of preposition "to," understood; "letter," objective case, object of verb "gave;" "my," possessive case, shows possession of noun "friend;" "friend," objective case, object of preposition "for;" "attorney," objective case, used in apposition with "friend."

120. Make one complex sentence of the following: He loved to tell long stories. These stories were about the dark old warriors. There were portraits of these warriors. The portraits looked grimly down from the walls.

Ans. He loved to tell long stories about the dark old warriors, whose portraits looked grimly down from the walls. A complex sentence.

past; *have* is used with *may*, *must*, for the present perfect, and with *might*, *could*, *would*, *should*, for the past perfect.

129. Write a compound-complex sentence containing an adverbial object.

Ans. She whom you have wed is worthy, and I hope you may live many *years* in unalloyed happiness.

130. Write the second person singular of the verb *go* in all the modes and tenses.

Ans. Indicative mode: Present, *thou goest*; past, *thou wentst*; future, *thou wilt* or *shalt go*; perfect, *thou hast gone*; pluperfect, *thou hadst gone*; future perfect, *thou wilt* or *shalt have gone*. Potential mode: Present, *thou mayst*, *canst* or *must go*; past, *thou mightst*, *couldst* or *wouldst go*; perfect, *thou mayst have*, *canst have* or *must have gone*; pluperfect, *thou mightst have*, *couldst have*, *wouldst have* or *shouldst have gone*. Subjunctive mode: Present, *if thou go*; past, *if thou went*. Imperative mode: Present, *go thou*.

131. Combine the following statements into a complex sentence: The girls went out. They went out at a side door. They joined the boys. The boys were busy. The boys were cleaning their guns. The boys were on the western porch.

Ans. The girls went out at a side door to join the boys who were busy on the western porch cleaning their guns.

132. Write original sentences illustrating the following: *a*) a complex imperative sentence, *b*) a compound sentence one member of which is complex. *c*) an interrogative sentence containing an adverbial clause.

Ans. *a*) Weigh every word before you speak, *b*) I will go and he may remain if he wishes, *c*) How could he refuse to go when he was asked?

133. Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) Nobody but the doctor and the nurse was allowed in the room. *b*) Nothing but books and flowers seem to interest her. *c*) Let each one try to do his work well. *d*) They are all going but you and

I. e) I have no objection to his going. f) This building is neither a chapel or a school. g) Did you say that the Rhine river flowed through Germany?

Ans. b) Nothing but books and flowers *seems* to interest her. Nothing is taken as singular, therefore *seem* should be changed to *seems*, for a verb must agree with its subject in person and number, and nothing being the subject of *seems*, *seems* must agree with it in number and person. d) They are all going but you and me. But is here used as a preposition in the sense of except and therefore I, being the object of but, should be changed to *me*, for the object of a preposition is in the objective case. e) I have no objection to (his) going. f) This building is neither a chapel nor a school. Or should be changed to *nor* for *or* is used with either, as: either-or, and *nor* is used with neither, as: neither-nor. g) Did you say that the Rhine river flows through Germany? *Flowed* should be changed to *flows*, because "that the Rhine flows through Germany is an unchangeable fact," and unchangeable facts should be represented by the present tense.

134. Write sentences containing a) the positive degree of the adverb *better*, b) the comparative degree of *often*, c) the superlative degree of *far*, d) the possessive plural of *child*, e) the objective case of *we*.

Ans. a) He speaks well for so young a man.

b) He goes $\left\{ \begin{array}{c} \text{oftener} \\ \text{or} \\ \text{more often} \end{array} \right\}$ than I do.

c) He is the $\left\{ \begin{array}{c} \text{farthest} \\ \text{or} \\ \text{furthest} \end{array} \right\}$ away from the village.

d) These are the *children's* books.

e) You do not want to give it to us.

135. Analyze by diagram or otherwise the following sentence: He heard *Clara's* gladsome voice as she weeded and *watered* the flower bed *which* had been given her for *her* own.

Ans. It is a complex declarative sentence. Principal clause is *He heard voice*. Subject of principal clause is *He*; predicate *heard*; *heard* is completed by the object *voice* and is also modified by the adverbial clause of time, *she weeded and watered*. *Voice* is modified by the adjective *gladsome* and the possessive noun *Clara's*. The subject of the adverbial clause is

she; predicate is *weeded* and *watered*, completed by the object *flower bed* which is modified by the adjective *the* and the adjective clause *which had been given*. The principal and the adverbial clauses are connected by the conjunctive adverb *as*. The subject of the adjective clause is *which*; predicate *had been given* completed by indirect object *her* and modified by the adverbial phrase *for her own*. The phrase consists of the preposition *for* with its object *own*. *Own* is modified by *her*.

136. Write original sentences illustrating the use of *few* as a) an adjective, b) a pronoun; *that* as a) an adjective, b) a conjunction; *very* as an adjective.

Ans. a) *Few* substances are found in a pure state. b) *Few* shall part, where many meet. c) *That* book is mine. d) He says *that* he will go. e) This is the *very* essence of truth.

137. Give the part of speech and the syntax of *each* italicized word in the following: *He could have counted every footstep that Charley took as he trundled his wheelbarrow along the gravel walk.*

Ans. *He* is a personal pronoun, nominative case, subject of *could have counted*. *Footstep* is a noun, objective case, object of *could have counted*. *That* is a relative pronoun, objective case, object of *took*. *As* is a conjunctive adverb, connects the clause *Charley took* and *he trundled*. *Along* is a preposition, shows the relation between its object *walk* and *trundled*.

138. Give the classification and the syntax of *each* subordinate clause in the following sentences: a) *Shortly came a sound that threw the doe into a panic of terror*, b) *I suddenly discovered that I didn't want to see a bear*, c) *It suddenly occurred to me how I could divert his mind*.

Ans. a) Adjective, modifies *sound*, b) Noun clause, object of *discovered*, c) Noun clause, apposition with *it*.

139. Correct the following sentences and give the reason for each correction: a) *As my parents were unable to go, they gave the tickets to my sister and I*, b) *Diamonds are more valuable than all the precious stones*, c) *He don't know who is to blame*, d, e) *Have either of you a copy of the directions that was given in class yesterday?*

Ans. a) Substitute in the given sentence *me* for *I*. The objective case should be used after the preposition *to*. b) Diamonds are the most valuable of all the precious stones, *or* diamonds are more valuable than the other precious stones. The thing compared should not be included with the things with which it is compared. c) He does not know who is to blame. *Don't* is not the correct contraction of *does not*. d, e) Substitute in the given sentence *has* for *have* and *were* for *was*. A verb should agree with its subject in number.

140. Correct the following if necessary:

- a) I would like to have seen you.
- b) Whom do you think he is?
- c) Each one of the boys have seen it.
- d) I expect you will find bad roads.

Ans. a) I should like to have seen you.

b) Who do you think he is?

c) Each of the boys has seen it.

d) I expect you to find bad roads.

141. Show in sentences the distinctive use of each of the following words: at, in, to, beside, besides, between, among, by.

Ans. Were you *at* home yesterday?

The boys are at play *in* the yard.

He came *to* town this morning.

She sat *beside* her teacher.

I have another book *besides* this.

142. Write two sentences each containing correlative conjunctions.

Ans. I *neither* know *nor* care who won the prize. Both John *and* Henry were frightened.

143. Compare and contrast: *clause* and *clausal phrase*. Illustrate.

Ans. A clause is a group of words having a subject, predicate, and copula, and used as a part of a more complete sentence. A clausal phrase is a phrase having a clause for its principal term. A clause may make complete sense, a clausal phrase cannot. There has been some dispute about *who wrote Shakespeare's plays*. The *italicized* words constitute a clausal phrase. The last four words form a subordinate clause.

144. What personal pronouns have no gender?

Ans. All except the third person singular.

145. How is the gender of collective nouns determined?

Ans. A collective noun is neuter gender when the objects are considered as a unit. The gender of a collective noun, representing objects acting separately, is determined by the sex of the objects.

146. Write sentences illustrating three dependent and three independent constructions of the nominative case.

Ans. Dependent constructions: Subject of a finite verb — The *boy* is sick; attribute complement of a verb — Roosevelt is *President*; apposition — Mr. Jones, a *lawyer* of prominence, died yesterday. Independent constructions: Direct address — *William*, come here; with a participle — *Cæsar* having crossed the Rubicon, Pompey retired into Greece; exclamation — The *boy!* was he drowned?

147. What is meant by the principal parts of the verb?

Ans. The principal parts of a verb, as usually given, are: the root form (simple infinitive), the past tense, and the past participle. These forms are so called because in most verbs the entire conjugation can be built up if these forms are known.

148. Combine the following statements into a simple sentence: The hermit was a good man. He was in his garden. He sat on a bench. The bench was under a tree. He held his prayer-book in his hand.

Ans. The hermit, a good man, was seated on a bench under a tree in his garden, holding his prayer-book in his hand.

149. Write *a*) an exclamatory sentence containing an infinitive phrase, *b*) a compound imperative sentence, *c*) a complex sentence containing a noun clause.

Ans. *a*) You are going to London to-night! *b*) James, take this book to your mother, and you, Mary, remain here with me. *c*) It was quite evident that he was ill.

150. Write original sentence illustrating the use of *but* as a) an adverb, b) a conjunction; *since* as a) a preposition, b) a conjunction; *only* as an adjective.

Ans. a) *But* few scholars are perfect in all their studies. b) I went away *but* John remained at home. a) You have improved a great deal *since* last year. b) I will stay at home *since* you are going away. You are the *only* person that had the last sentence correct.

151. Classify the following sentences as to form and as to use (meaning): a) It was very seldom that one of his tribe was eaten by the North American tiger, b) How alert, supple, free, she was! c) Suddenly she started, head erect, eyes dilated, a tremor in her limbs, d) But consider what a shot it was! e) Was there one who would have let her go back to her waiting fawn?

Ans. a) Complex declarative. b) Simple exclamatory. c) Simple declarative. d) Complex exclamatory. e) Complex interrogative.

152. Combine the following statements into a complex sentence: It was time to eat my luncheon. I took shelter under a pine tree. The pine tree was scraggy. The pine tree had rooted itself in the edge of the slope. The slope was rocky.

Ans. The time having come to eat my luncheon, I took shelter under a scraggy pine tree that had rooted itself in the edge of the rocky slope.

153. Write the third person singular of *each* of the tenses of the indicative active of *do*, giving in each case the name of the tense. Write *four* infinitives of *do*, giving the name of each.

Ans. Present, *she does*; past, *she did*; future, *she will do*; present perfect, *she has done*; future perfect, *she will have done*. Present infinitive: Active, *to do*; passive, *to be done*. Past perfect infinitive: Active, *to have done*; passive, *to have been done*.

154. Write original sentences illustrating *four* different uses of the objective case, stating the use of the *objective* that each sentence illustrates.

163. Turn to whosoever shall ask alms a sympathetic ear. Expand the relative pronoun and give its three uses.

Ans. This sentence, expanded, would be: "Turn to *him who* shall ask alms a sympathetic ear." The word "whosoever" has the use of an object of the preposition "to;" the subject of the verb "shall ask;" and also a connective use, joining the subordinate element to the word which it modifies.

164. What is a pure verb? What is its use?

Ans. A pure verb is one that asserts of its subject an attribute expressed by some other word; as, *Flowers are beautiful*. Its use is to assert the predicate of the subject.

165. What is a diminutive adjective?

Ans. A diminutive adjective is one which expresses a degree of the quality less than that expressed by the positive. "The cloth has a *yellowish* tint."

166. What cultural value is there in the formal analysis of sentences?

Ans. Secures order, system, concentration, quickness of perception, keenness of discrimination, confidence, and clearness of judgment and expression.

167. Define inflection. What parts of speech are inflected?

Ans. a) The variations that parts of speech undergo to express person, gender, etc.; modifications of words.

b) Nouns, pronouns, adjectives, verbs, adverbs.

168. Define defective verb, nominative absolute, collective noun. Illustrate each by sentence.

Ans. Defective verb, wants some of its principal parts. "*Beware the avalanche!*"

Nominative absolute, case of a noun used before a participle independent of the remainder of the sentence. "*The snow melting*, she returned."

Collective noun, name of a group of persons or things. "*The buffalo travel in a herd.*"

169. Write sentences illustrating a) *a noun used as a factitive object*, b) *an infinitive used as an adverb modifier*, c) *an indirect object*.

Ans. a) We choose Roosevelt *president*.

b) He fought to *save us*.

c) Read *me* the lesson.

170. Correct the following sentences and give the reason for each correction: a) We have some beautiful flowers which grows down in the meadow, b) When one starts to do anything, they often try to do it in a hurry, c, d) One day when I was visiting a friend, a lady called who I never seen before, e) If he had took more time he would have made better progress.

Ans. a) We have some beautiful flowers which *grow* down in the meadow. A finite verb must agree with its subject in person and number. b) When one starts to do anything, he often tries to do it in a hurry. A relative pronoun agrees with its antecedent in gender and number and a finite verb agrees with its subject in number. c, d) One day when I was visiting a friend, a lady called *whom* I never *saw* before. The direct object of an action is put in the objective case. The past participle should not be used for the past indicative, e) If he had *taken* more time he would have made better progress. The past indicative of a verb should not be used for the past participle.

171. Combine the following statements into a single sentence: The nest was very snug. The nest was a compact structure. The nest was placed in the forks of a tree. The tree was a small maple. The maple was about twelve feet high.

Ans. The snug nest was a compact structure placed in the forks of a small maple tree about twelve feet high.

172. Give the syntax of each subordinate clause in the following sentences: a) It was possible that I might start up a partridge, b) He did not know whether she would agree with him, c) She sat down on the ground where she was standing, and began to weep, d) When I had climbed the hill, I set my rifle against a tree.

Ans. a) *I might start* is a noun clause used in opposition with the pronoun *it*. b) *She would agree* is a noun clause used as the object of the verb *did know*. c) *She was standing* is an adjective clause modifying the noun *ground*. d) *I had climbed* is an adverbial clause of time, modifying the verb *set*.

172a. Give the syntax of *each* italicized word in the following sentences: a, b) Columbus, the *discoverer* of America, was a courageous *man*, c, d, e) Give *me* another *book* from that shelf, *John*.

Ans. a) *Discoverer* is a noun in the nominative case, used in apposition with *Columbus*. Rule: A noun or pronoun used to identify or explain another noun or pronoun is put in the same case, b) *Man* is a common noun used as an attribute complement of the verb *was*. Rule: A noun or pronoun used as an attribute is in the nominative case, c) *Me* is a simple personal pronoun in the objective case, object of the preposition *to* understood. Rule: A noun or pronoun used as the object of a preposition is put in the objective case, d) *Book* is a common noun, objective case, object of the verb *give*. Rule: The direct object of an action is put in the objective case, e) *John* is a proper noun, nominative case, used independently in direct address. Rule: A noun or pronoun used independently in direct address is put in the nominative case.

173. Write sentences containing the plural forms of the following nouns: *canto*, *crisis*, *ox*, *wolf*, *cry*.

Ans. The cantos are still here.
The crises are severe.
The oxen are useful.
All wolves howl very loud.
The cries of the child were loud.

174. Give the part of speech and the syntax of *each* of the italicized words in the following sentence:

The eastern tribes have *long* since disappeared; the *forests* that sheltered them have been laid low, and scarce any traces remain of them in the *thickly* settled *states* of New England.

Ans. *Long* is an adverb and it modifies *since*.
Forests is a noun and is the subject of *have been laid*.

That is a relative pronoun, and relates to *forests*, third person plural number, subject of *sheltered*.

Thickly is an adverb and modifies *settled*.

States is a noun and is the principal word in a phrase.

175. Combine the following statements into a single sentence:

It was one winter evening. Two cottagers were sitting by their cheerful peat fire. They were sitting in a small lonely hut. The hut was on the edge of a moor. The hut was some miles distant from any other habitation.

Ans. One winter evening, two cottagers were sitting by their cheerful peat fire in a small lonely hut, which was on the edge of a moor, some miles distant from any other habitation.

176. Write *a*) a complex sentence containing two subordinate clauses; *b*) a simple interrogative sentence containing a participial phrase.

Ans. *a*) The dog that was hurt ran home as fast as he could. *b*) What is gained by doing wrong?

177. Write original sentences containing *a*) a progressive participle, *b*) a past participle, *c*) a present passive infinitive, *d*) a perfect infinitive, *e*) a defective verb.

Ans. *a*) My friend, *having been thinking* of buying a house, asked my advice. *b*) The picture, *bought* in Buffalo, is my favorite, *c*) She was told that he was *to be buried* to-day, *d*) She was *to have bought* the dress yesterday, *e*) I *shall be* there.

178. Mention the simple relative pronouns and explain how they differ from one another in use.

Ans. Who, that, which, what.

Who refers to persons only; *that* refers to persons, animals and things; *which* refers to animals and things; *what* refers to things.

179. Give the principal parts of *sit*, *set*, *lay*, *lie*. Write sentences containing the past (imperfect) tense of each verb in the third person singular, indicative mode.

<i>Ans.</i>			
Present	Past	Present	Past
tense.	tense.	participle.	participle.
<i>Sit</i>	<i>Sat</i>	<i>Sitting</i>	<i>Sat</i>
<i>Set</i>	<i>Set</i>	<i>Setting</i>	<i>Set</i>
<i>Lay</i>	<i>Laid</i>	<i>Laying</i>	<i>Laid</i>
<i>Lie</i>	<i>Lay</i>	<i>Lying</i>	<i>Lain</i>

She *sat* in a low chair. She *set* the dish on the table. John *laid* the flowers there. He *lay* on the grass.

180. Correct the following sentences and give the reason for each correction: *a)* The ship ran down a small fishing smack that was laying at anchor, *b)* The birds of Brazil are more beautiful than any in South America, *c)* He who is most loyal we think to be most worthy, *d)* I and my father were invited to go with them, *e)* I cannot believe but what he knew better.

Ans. Substitute *lying* for *laying*. The transitive verb *lay* should not be used for the intransitive verb *lie*. *b)* Substitute *any others* for *any*. Objects should not be compared with themselves. *c)* He is most loyal whom we think to be the most worthy. Never use the nominative case for the objective. *d)* Substitute *my father and I* for *I and my father*. The third person is more important than the first person, and precedes it. *e)* Substitute *that* for *what*. The double relative should not be used for the conjunction *that*.

181. Give the classification (subdivision if adverbial) and the syntax of *each* of the subordinate clauses in the following: *a)* His writings contain the spirit, the aroma of the age in which he lives, *b)* He has commonly a broad, full face, curiously mottled with red, as if the blood had been forced by hard feeding into every vessel of the skin, *c)* Let them once in a while turn loose the whole school of Westminster among us, that at any rate we may now and then have an airing.

Ans. *a)* *He lives*, adjective clause, modifies *age*. *b)* *Blood had been forced*, adverbial clause denoting condition, modifies *would be* (understood). *c)* *We may have*, adverbial clause denoting purpose, modifies *turn loose*.

182. Write sentences containing the possessive plural of *each* of the following: *lady*, *son-in-law*, *hero*, *ox*, *fisherman*.

Ans. The *ladies'* aid society intends to have a food sale. This comes from my *sons-in-law's* charity. This is the *heroes'* day. The *fishermen's* boats came into the bay empty.

183. Combine the following statements into a complex sentence containing but *one* subordinate clause: In May a sparrow built its nest. The sparrow had evidently met with disaster earlier in the season. It built its nest in a mass of woodbine. The mass was thick. The woodbine was near my window.

Ans. In May a sparrow, having evidently met with disaster earlier in the season, built its nest in a thick mass of woodbine which was near my window.

184. Write the first person singular of *each* of the following: a) the passive, indicative, present of *lead*, b) the active, indicative, past (imperfect) of *see*, c) the active, indicative, present perfect (perfect) of *freeze*, d) the progressive, indicative, past perfect (pluperfect) of *drive*, e) the active, indicative, future perfect of *lay*.

Ans. a) I am led. b) I saw. c) I have frozen. d) I had been driving. e) I shall have laid.

185. Write original sentences illustrating *four* different uses of the nominative case. State the use of the nominative that each sentence illustrates.

Ans. The *book* is here.—The nominative used as subject. Washington was *president* of the United States.—Predicate nominative. Mr. B., the *banker*, has failed.—Nominative by apposition. *Mary*, are you coming?—Nominative by direct address.

186. What parts of speech are inflected, and for what purpose in each case?

Ans. Nouns, adjectives, pronouns, verbs, and adverbs. To show a different meaning or relation.

187. Give the comparison of the following adjectives: Good, much, evil, farthest, little, next, full, dead, greenish.

Ans. Good, better, best; many or much, more, most; evil, worse, worst; far, farther, farthest; little, less, least; near, nearer, next; full and dead are not compared; greenish, more greenish, most greenish.

188. Illustrate by examples three ways of forming the plural of nouns.

Ans. Man, men; box, boxes; ox, oxen.

189. Give three examples of a change in the meaning of a noun by a change in its number.

Ans. Customs, numbers, letters.

190. Illustrate by a sentence and explain the dual function of a compound relative pronoun.

Ans. "Whosoever will, let him take of the water of life freely." "Whosoever" combines the office of antecedent and relative.

191. Give a sentence in which a participle may be considered an adverbial predicate.

Ans. He came *staggering* to me.

192. Illustrate by sentences the distinction between an adjective pronoun and pronominal adjective.

Ans. The best authorities make them identical.

193. Name all the points to be brought out in parsing a finite verb.

Ans. Tell whether regular or irregular. Why? Transitive or intransitive. Why? Give principal parts. Voice, mode (if subjunctive, why), tense, person, number, why? Rule. Conjugate it. Give synopsis.

194. Define modification, as a grammatical term. Give outline of the modifications of the various parts of speech.

Ans. a) Modification is the adding of something to or the changing of the meaning of one word by the use of another, called a modifier.

b) **Noun:** Noun, pronoun, adjective, participles, infinitives for modifiers.

Adjective: Adjective, adverb, participle, infinitive.

Pronoun: Noun, adjective, participle, infinitive.

Verb: Adverb, adjective, noun, pronoun, participle, infinitives.

Adverb: Adverb, participles, infinitives.

195. Discuss conjunctions.

Ans. A conjunction is a word used to connect words, phrases or sentences or to introduce subordinate sentences.

There are two general classes; co-ordinate and subordinate. Co-ordinate connect co-ordinate terms, and are of two classes, copulative and adversative, *and* is co-ordinate, *or* is adversative.

Subordinate introduce subordinate sentences or clauses, and are divided into condition, if, reason, *for*, end, *that*, comparison, *than*, etc.

196. Write sentences illustrating the participle in four different uses.

Ans. Subject of a finite verb, His studying is praiseworthy.

Subject of an infinitive, He thought studying to be a waste of time.

Object of a preposition, I have no hope of his paying me.

Factitive object, He considered your succeeding his failing.

197. Give the part of speech and the syntax of *each* of the italicized words in the following: *a, b)* I have been to the library two or three *times since*, *c, d)* Whether it was *another* of those odd daydreams to which I am subject, I have never to this moment been *able* to discover, *e)* Here he is generally surrounded by an *admiring* throng of hostlers.

Ans. a) *Times* is a noun, adverbial objective, modifies *have been*. *b)* *Since* is an adverb, modifies *have been*; *c)* *another* is an indefinite pronoun, used in predicate nominative after *was*; *d)* *able* is an adjective, used as a predicate adjective with *have been*; *e)* *admiring* is a participial adjective, modifies *throng*.

198. Write original sentences containing *three* of the following: *a)* an adverbial clause of concession, *b)* an adverbial clause of cause, *c)* a noun clause used in apposition, *d)* a noun clause used as the object of a preposition, *e)* an infinitive phrase used as the object of a preposition.

Ans. a) The car has gone, though she thought it would wait. b) He hurried because it was late. c) The fact that the world is round is well known. d) It depends upon how you understand the matter. e) They are about to go.

199. Give the classification (subdivision) and the syntax of each of *three* of the italicized phrases in the following: a) His hands are thrust *into the pockets* of his great coat, b, c) I am tempted to illustrate them *by some anecdotes* of a Christmas passed *in the country*, d) He writes *from the heart*; e) Authorship was an unprofitable craft, pursued chiefly *by monks* in the solitude of their cloisters.

Ans. a) Adverbial phrase denoting limit of motion, modifies *thrust*; b) Adverbial phrase denoting means, modifies *illustrate*; c) Adverbial phrase denoting place from which, modifies *writes*; e) Adverbial phrase denoting agent, modifies *pursued*.

200. Give the classification (subdivision if adverbial) and the syntax of *each* of the subordinate clauses in the following: a) Perhaps it might be owing to the pleasing serenity that reigned in my own mind, that I fancied I saw cheerfulness in every countenance throughout the journey, b) I was reminded of those days when I had known neither care nor sorrow, c) The country maid leaves half her market, and must be sent again, if she forgets a pack of cards on Christmas eve.

Ans. *That reigned*, adjective, modifies *serenity*; *I fancied*, noun clause, apposition with *it*; *I saw*, noun clause, object of *fancied*; *I had known*, adjective, modifies *time*; *she forgets*, adverbial, conditional, modifies *leaves* and *must be sent*.

201. Give etymology of *educate*, *intervene*.

Ans. *Educate* = Latin *educatus*, p. p. of *educare*, from *educere*, to lead forth.

Intervene = Latin *intervenire*, *inter* (between) + *venire* (to come).

202. Give a homonym for each of the following words: *Nay*, *manner*, *prier*, *rhyme*, *viol*.

Ans. *Nay*, *neigh*; *manner*, *manor*; *prier*, *prior*; *rhyme*, *rime*; *viol*, *phial*.

203. *Indicate pronunciation of the following: Carbine, exquisite, granary, precedence, plebeian.*

Ans. (See dictionary.—Ed.)

204. *Give explanation of the following abbreviations: A. D., Eng., et al., id., f. o. b.*

Ans. A. D. = Anno Domini, in the year of our Lord; Archduke.

Eng. = England; English; engraving.

et al. = (*et alibi*) and elsewhere; (*et alii* or *aliæ*) and others.

id. = (*idem*) the same.

f. o. b. = free on board.

205. *Give synopsis of regard in second person, plural, indicative, active.*

Ans. Present, you regard.

Present Perfect, you have regarded.

Past, you regarded.

Past Perfect, you had regarded.

Future, you will regard.

Future Perfect, you will have regarded.

206. *Write sentences illustrating—*

a) Indirect object; b) noun as adverb modifier; c) factitive object.

Ans. a) Give me the book.

b) He is six feet tall.

c) He made the plank a raft.

207. *Define comparison. Explain the different degrees.*

Ans. a) The modification of adjectives and adverbs, by which difference in the degree of what is denoted by the adjective or adverb is indicated.

b) The positive is the simplest, uninflected form of adjective or adverb; as *good*.

The comparative form indicates more or less as compared with the positive; as *better*.

The superlative form indicates that the quality is the highest or lowest degree that can exist within a group, or class; as *best*.

208. *Discuss the pluralizing nouns.*

Ans. Nouns form their plurals regularly by adding *s* to their singulars; common nouns ending in *ch* soft, *s*,

sh, *x*, *g*, or *o*, preceded by a consonant add *es*; ending in *y* preceded by a consonant, change *y* to *i* and add *es*; ending in *f* or *fe*, preceded by any long vowel except *oo*, or by *l*, change *f* to *v*, and add *es*; a few add *en*; some foreign nouns retain their foreign plurals; letters, figures, signs, and words used technically as names add apostrophe and *s*; some nouns form their plurals by radical variations, as *man*, *men*, *louse*, *lice*; complex or compound nouns pluralize the basic part of their structure; some nouns have two plural forms; some nouns plural in thought have no plural form, &c., &c.

209. Write original sentences containing *three* of the following: *a*) *why* introducing a noun clause, *b*) an adjective clause modifying the object of a sentence, *c*) a noun clause used as the object of an infinitive, *d*) an adverbial clause of concession, *e*) an adverbial clause of degree.

Ans. *a*) I do not know why he went. *b*) Did you see the man that left the message? *c*) He came to say that he could not go. *d*) Though he slay me yet I shall do this. *e*) The higher we climb, the colder it becomes.

210. Write the following sentences in correct form and give the reason for each correction: *a*) It had once been his good fortune to have saved the life of Scotland's king, *b*) When the pond is frozen over all of we boys and girls go skating, *c*) He asked a friend whom he thought could speak eloquently, *d*) The oranges were the best that I have ever ate, *e*) I regret very much that I will not be able to visit you in Florida this winter.

Ans. *a*) Substitute *to save* for *to have saved*. The time of the infinitive *to save* is relatively present to that of the principal verb. *b*) Substitute *us* for *we*. The objective case should be used after the preposition *of*. *c*) Substitute *who* for *whom*. The subject of a finite verb should be put in nominative case. *d*) Substitute *eaten* for *ate*. Do not use the past tense for the past participle. *e*) Substitute *shall* for *will*. Use *shall* instead of *will*, in the first person, to simply express futurity.

211. In the following sentences change the subordinate clauses to phrases and give the syntax of each phrase formed: *a*) Books were written that they might give pleasure, *b*) I determined that I would not give up

my point, c, d) He is particularly full of care and business during this season, because he has so many commissions that he must execute, e) He wears about his neck a huge roll of colored handkerchief which is knowingly knotted and tucked in at the bosom.

Ans. a) Books were written *to give pleasure*. Adverbial, expresses purpose, modifies *were written*. b) I determined not *to give up my point*, object of *determined*. c, d) *Having* so many commissions *to execute*, he is particularly full of care and business during this season. *Having commissions*, modifies *he*; *to execute*, modifies *commissions*. e) He wears about his neck a huge roll of colored handkerchief, *knowingly knotted and tucked in at the bosom*, modifies *handkerchief*.

212. Give the part of speech and the syntax of *each* of the italicised words in the following:

His waistcoat is commonly of some bright color, *striped*, and his small clothes extend *far* below the knees, to meet a pair of jockey boots which reach *about half way up* his legs.

Ans. *Striped* is a descriptive adjective, modifies *waistcoat*; *far* is an adverb; compared, *far*, *farther*, *farthest*; modifies the phrase *below the knees*; *about* is an adverb of degree, modifies *halfway*; *halfway* is an adverb of degree, modifies the phrase *up his leg*; *up* is a preposition. It shows the relation between its object *legs* and *reach*.

213. Write original sentences containing a) a present passive infinitive, b) a present progressive infinitive, c) a perfect infinitive, d) a perfect passive participle, e) a defective verb.

Ans. a) He does not wish *to be seen*. b) He expects *to be traveling* in Europe next year. c) This seems *to have given* him pleasure. d) The letter *having been written*, I hastened to mail it. e) You *must go*.

214. Give the part of speech and the syntax of *each* italicised word in the following:

They would teach *him something* about the history and the distinguished *people* of his country *which* he has never read in *any* of his schoolbooks.

Ans. *Him* is a personal pronoun, used as indirect object (dative objective) after the verb *teach*.

Something is a noun, objective case, direct object of *teach*. *People* is a noun, objective case, object of the preposition *about*. *Which* is a relative pronoun referring to *something* as its antecedent, objective case object of *has read*. *Any* is an adjective pronoun, objective case, object of the preposition *in*.

215. Correct the following sentences and give the reason for each correction: *a)* Come up and I will learn you to skate, *b)* I am anxious to see my cousin who I have never met, *c)* He should have went himself with the message, *d)* You have never seen anything like our climate, *e)* In the winter we have sleigh rides which adds to our pleasures.

Ans. *a)* Substitute *teach* for *learn*. *To teach* means to give instruction, *to learn* means to receive instruction. *b)* Substitute *whom* for *who*. The direct object of a verb should be in the objective case. *c)* He himself should have *gone* with the message. Do not use the past tense for the past participle.

d) Substitute *anything* for *nothing*. Two negatives make an affirmative. *e)* Substitute *add* for *adds*. A verb should agree with its subject in number.

216. Give the classification and the syntax of each subordinate clause in the following sentences: *a, b)* When he was fairly clear of the mountain he began that sweeping spiral movement in which he climbs the sky, *c)* It is not probable that a bee ever gets lost by wandering into strange and unknown parts.

Ans. *a)* *He was clear*, adverbial clause of time, modifies *began*; *b)* *he climbs*, adjective clause, modifies *movement*; *c)* *bee gets lost*, noun clause, opposition with *it*.

217. Write original sentences illustrating the following: *a)* a complex sentence containing a compound subordinate clause, *b)* a compound sentence with one complete member. *c)* a simple sentence with a compound subject and a compound predicate.

Ans. *a)* After the storm ceased and the wind fell, the water of the lake became quiet. *b)* Fill your heart with goodness and you will find that the world is full of good. *c)* John and James study and recite grammar.

218. In the following sentences *a)* change the adverb to a prepositional phrase: The weasel climbs trees

and explores them easily; b) change the active to the passive voice: A screech-owl had thrust its claw into a cavity of a tree; c) change the passive to the active voice: The life of birds is beset with dangers.

Ans. a) The weasel climbs trees and explores them with ease. b) The claw of the screech-owl had been thrust into a cavity in a tree. c) Dangers beset the life of a bird.

219. Combine the following statements into a complex sentence:

The evening was far advanced. The squire would not permit us to change our traveling dresses. He ushered us at once to the company. The company was assembled in a hall. The hall was large and old-fashioned.

Ans. Since the evening was far advanced, the squire would not permit us to change our traveling dresses, but ushered us at once to the company assembled in a large, old-fashioned hall.

220. Correct the following sentences and give the reason for each correction: 1) Douglas said that during the war Ellen and him would go away and hide themselves, 2) About half-past six the wind begun to blow, 3) The whole school took part, each class having one-half hour for their program, 4) These are the two boys whom he thought had gone away, 5) I know you are a great deal wiser than me, 6) The introduction of such beverages as tea and coffee have not been without effect.

Ans. 1) Substitute *he* for *him*. The subject of a finite verb should be in the nominative. 2) Substitute *began* for *begun*. Do not use the past participle for the past tense. 3) Substitute *its* for *their*. A personal pronoun should agree with its antecedent in number. 4) Substitute *who* for *whom*. Subject of a finite verb should be in the nominative. 5) Substitute *I* for *me*, nominative, because subject of *am wiser* (understood). 6) Substitute *has* for *have*. A verb agrees with its subject in number.

221. Substitute for each italicized adjective an adjective phrase but do not change the general meaning of the sentence: 1) *Stone* houses were built by the early Dutch settlers, 2) He carried a *very beautiful* gold-

headed cane, 3) He ran till he was *breathless*, 4) The count lives in his *ancestral* halls, 5) The poor child's clothing was *ragged*, 6) The president considered him a *strictly honest* man.

Ans. 1) *Stone houses*—houses of *stone*, 2) *very beautiful* gold-headed cane—gold-headed cane of *great beauty*, 3) *breathless*—out of *breath*, 4) his *ancestral* halls—halls of his *ancestors*, 5) *ragged*—in *rags*, 6) *strictly honest* man—man of *strict honesty*.

222. Correct the following sentences and give the reason for each correction: *a)* Let you and I go on the excursion, *b)* Either of the two sentences are correct, *c)* We did not think that it could be him, *d)* Neither he or his brother went out yesterday, *e)* They that try to help themselves I will help.

Ans. *a)* "Let you and I go on the excursion." Incorrect because the pronoun "I" is in the nominative case, and it should be "me," in the objective case, the object of "let." Correct: "Let you and me go on the excursion."

b) "Either of the two sentences are correct." Incorrect because "are" is in the plural number, and it should be "is," in the singular, to agree with a singular subject. Correct: "Either of the two sentences is correct."

c) "We did not think that it could be him." Incorrect because the pronoun "him" is in the objective case, and it should be "he," in the nominative, the attribute of "could be."

d) "Neither he or his brother went out yesterday." Incorrect because the correlative of "neither" is "nor." Correct: "Neither he nor his brother went out yesterday."

e) "They that try to help themselves. I will help." Incorrect because "they" is in the nominative case, and it should be "them," in the objective case. Correct: "I will help them that help themselves."

223. Make *one* complex sentence of the following: There were tender-hearted people in the valley. They would have spared the deer's life. They would have shut her up in a stable. They would have petted her.

Ans. "There were tender-hearted people in the valley who would have spared the deer's life, shut her up in a stable and petted her."

224. State what is meant by *each* of the following: *abstract noun, proper adjective, subordinate conjunction, adjective phrase, adverbial clause.*

Ans. An abstract noun is the name of a quality, action, being or state of being. A proper adjective is one that is derived from a proper noun. A subordinate conjunction is one that connects words, phrases and clauses of different rank. An adjective phrase is one that modifies a noun or pronoun. An adverbial phrase is one that performs the office of an adverb and therefore modifies verbs, adjectives or adverbs.

225. Write *a)* a simple declarative sentence containing an infinitive phrase, *b)* a compound imperative sentence containing an adverb of manner, *c)* a complex interrogative sentence containing an adjective clause.

Ans. *a)* I love to *hear* the birds singing. *b)* Mary, *quietly* close the door, and, Jennie, help Mary to correct her sentences. *c)* Has your father found the book *which he lost*?

226. Compare, giving every form, the adjectives *late, old*. Write the positive of the adverbs *most, best*.

Ans. Positive, late, old; comparative, later or latter, older or elder; superlative, latest or last, oldest or eldest. Positive, much, well.

227. Give the following forms of the verb *teach*: *a)* The present passive participle, *b)* the emphatic, past, first plural, *c)* the progressive, past, active, indicative, first plural, *d)* the past, passive, indicative, first plural, *e)* the interrogative, future, active, indicative, first plural.

Ans. *a)* Present passive participle, being taught; *b)* emphatic, past, first, plural, We did teach; *c)* progressive, past, active, indicative, first, plural, We were teaching; *d)* past, passive, indicative, first, plural, We were taught; *e)* interrogative, future, active, indicative, first, plural, Shall we teach?

228. Give words containing the following suffixes: *dom, ent, fy, ish, some*. Write sentences in which the words formed are correctly used.

Ans. *dom* = kingdom: My mind to me a kingdom is. *ent* = penitent: Did you say the child was penitent?

fy = satisfy: You may satisfy me by being attentive.
 ish = astonish: The magnificence of the capitol will astonish you.
 some = meddlesome: The fox is a meddlesome animal.

229. Write the principal parts of *each* of the following verbs: *fall, cry, throw, forget, lie (recline)*.

Ans. Fall, fell, falling, fallen; cry, cried, crying, cried; throw, threw, throwing, thrown; forget, forgot, forgetting, forgotten; lie, lay, lying, lain.

230. In the sentence, *Charles* spent the money *that* his father *gave* him, a) parse *Charles, gave*, b) give the part of speech and syntax of *that, him*.

Ans. "Charles" is a proper noun, third, singular, masculine, nominative, subject of "spent." "Gave" is an irregular, active, transitive verb. Its principal parts are: Present indicative, "give;" past indicative, "gave;" present participle, "giving;" past participle, "given." It is in the indicative mode, past tense, and agrees with its subject "father" in the third, singular. "That" is a relative pronoun, object of "gave." "Him" is a personal pronoun, object of "to" (understood).

231. It seems to have been Nelson's opinion that the Austrian cabinet regarded the conquest of Naples with complacency, and that its measures were directed so designedly not to prevent the French from overrunning it. Point out the clauses in the above sentence and explain their kind and relation.

Ans. "It seems opinion" is the principal clause. "that complacency" and "that overrunning it" are two subordinate clauses forming a part of the complex copula after *seems*.

232. Give the construction of *opinion, so, to prevent*.

Ans. *Opinion*—Nominative case, subject of the sentence which is introduced by the expletive *it*.

So—The sentence is clumsily constructed by the omission of *as*, the correlative of *so*. *So* is an adverb modifying *were directed*.

To prevent—infinitive used adverbially to modify *were directed*.

233. In the following quotation parse *rather, obsolete, what, barbarous*; give the syntax of the phrase *in*

the present day: Its language, to be sure, was *rather* quaint and *obsolete*, and its pronunciation, *what*, in *the present day*, would be deemed *barbarous*; but I shall endeavor, as far as I am able, to render it in modern parlance.

Ans. *Rather* is an adverb of degree, not compared, modifies the adjective *quaint*. *Obsolete* is an adjective, used as an attribute complement (predicate adjective) with *was*, not compared.

What is a compound relative pronoun equivalent to *that which*. *That* is third person, singular, neuter, agreeing with its antecedent *pronunciation*, nominative case, predicate nominative after *was* understood. *Which* is third, singular, neuter, nominative case, subject of *would be deemed*.

Barbarous is a descriptive adjective, positive degree. Compared: *barbarous*, *more barbarous*, *most barbarous*. It is used as an attribute complement (predicate adjective) with *would be deemed*. *In the present day*, adverbial phrase denoting time, modifies *would be deemed*.

234. Select from the following quotation the subordinate clauses, and give the classification (subdivision if adverbial) and the syntax of each clause selected: As I looked around upon the old volumes in their moldering covers, thus *ranged* on the shelves, and apparently never disturbed in their repose, I could not but *consider* the library a *kind* of literary catacomb, where authors, like *mummies*, are piously entombed, and left to blacken and molder in dusty oblivion. How much, thought I, has each of these volumes, now thrust aside with such indifference, cost some aching *head*!

Ans. *I looked*, adverbial clause of time, modifies *could consider*; *authors are entombed* and *left*, adjective clause, modifies *catacomb*; *each has cost*, noun clause, object of thought

235. Parse the italicised words in the following: Little Alice was already *asleep*; so grandfather, being *much* pleased with such an attentive audience, *began* to talk about matters that happened *long* ago.

Ans. *Asleep* is a descriptive adjective, not compared, attributive modifier of *Alice*. *Much* is an adverb of degree, positive degree, modifies *pleased*; *began* is an in-

regular transitive verb. Principal parts: present, *begin*; past, *began*; present part., *beginning*; past part., *begun*. It agrees with its subject *grandfather* in the third singular; *long* is an adverb of degree. Compared: *long*, *longer*, *longest*. It modifies the adverb *ago*.

236. Select from the following quotation *three* subordinate clauses and give the classification (subdivision if adverbial) and the syntax of each clause selected: Here the little quarto began *to heave* his sides and chuckle, until at length he broke out in a plethoric fit of laughter that had *well-nigh* choked him by reason of his excesssive *corpulency*. "Mighty well!" cried he, as soon as he *could recover* breath, "mighty well! and so you would persuade *me* that the literature of an age is to be perpetuated by a vagabond deerstealer."

Parse, from the quotation in question 1, *to heave*, *well-nigh*, *corpulency*, *could recover*, *me*.

Ans. *He broke*, adverbial clause of time, modifies *heave* and *chuckle*; *that had choked*, adjective clause, modifies *laughter*; *he could recover*, adverbial clause of time, modifies *cried*; *literature is*, objective clause, object of *persuaded*.

To heave is a present active infinitive from the regular transitive verb *heave*. Principal parts: present, *heave*; past, *heaved*; present part., *heaving*; past part., *heaved*. It is used in the objective case as the object of *began*. *Well-nigh* is an adverb of degree, not compared, modifies *had choked*. *Corpulency* is a noun, common, neuter, third, singular, objective case, object of the preposition *of*. *Could recover* is a regular, active, transitive verb. Principal parts: present, *recover*; past, *recovered*; present part., *recovering*; past part., *recovered*. It is in the potential mode, past tense, and agrees with its subject *he* in the third person, singular number. *Me* is a personal pronoun, masculine gender, first person, singular number, indirect object or dative case.

237. Analyze by diagram or otherwise the following sentence: If, in alarm, he uttered a plaintive *cry*, she bounded to him, and, with every demonstration of affection, licked *his* mottled skin till it *shone again*.

Parse, from the quotation in question 1, *cry*, *his*, *shone*, *again*.

Ans. It is a complex declarative sentence. *If he uttered a plaintive cry* is a dependent adverbial clause

of condition. It modifies the verb *bounded*. *He* is the subject and *cry* is the direct object of the verb *uttered*. *Plaintive* is an adjective. It modifies *cry*. *She bounded and licked his skin* is the principal clause. *To him* is a prepositional adverbial phrase. It modifies the verb *bounded*. *With every demonstration* is an adverbial phrase of manner. It modifies *licked*. *Of affection* is an adjective phrase. It modifies *demonstration*. *Mottled* is an adjective. It modifies *skin*. *Skin* is the direct object of the verb *licked*. *Till it shone again* is a dependent adverbial clause of time. It modifies *licked*. *Again* is an adverb. It modifies *shone*.

Cry is a common noun; third person; singular number; neuter gender; objective case; object of verb *uttered*. *His* is a simple personal pronoun; third person; singular number; masculine gender; possessive case; modifies the noun *skin*. *Shone* is an irregular verb. Principal parts: present, *shine*; past, *shone*; present participle, *shining*; past participle, *shone*. Intransitive; indicative mode; past tense, third person, singular number, to agree with its subject *it*. *Again* is an adverb of time, modifying the verb *shone*.

238. Parse the italicized words in the following:
a, b) The hunters then make their way to this retreat on snow-shoes, and from the top of the banks pick off the deer at leisure with their rifles, *c, d) The great bugaboo* of the birds is the owl.

Ans. *Hunters*, common noun, third person, plural number, masculine gender, nominative case, subject of the verbs *make* and *pick*. *Then*, adverb of time, not compared. It modifies the verb *make*. *Great*, descriptive adjective. Comparison: positive, *great*; comparative, *greater*; superlative, *greatest*. Positive degree, modifies the noun *bugaboo*. *Owl*, common noun, third person, singular number, common gender, nominative case, attribute complement of the verb *is*.

239. Parse the italicized words in the following:
a) The children's shoes were bought in New York. *b) Mr. Brown*, the bank cashier, is very ill. *c, d) John*, will you do me a favor?

Ans. "Children's" is a common noun, common gender, third person, plural number, possessive case, and is a possessive modifier of "shoes."

"Cashier" is a common noun, third person, singular number, masculine gender, nominative case, and is an explanatory modifier of "Mr. Brown."

"John" is a proper noun, second person, singular number, masculine gender, nominative case, and is independent by address.

"Me" is a personal pronoun first person, singular number, common gender, objective case, and is an adverbial modifier of "will do."

240. Parse the italicized words in the following:
a, b) He began that sweeping spiral movement in which he climbs the sky, c) In a few days one of them had eaten the other, d) I soon regretted my precipitation in killing her, because such interference is generally unwise.

Ans. a) That is a demonstrative adjective. It modifies *movement*. *b) Which* is a relative pronoun; its antecedent is *movement*; third person; singular number; neuter gender; objective case, object of preposition *in*. *c) Had eaten* is an irregular transitive verb. Principal parts: present, *eat*; past, *ate*; present participle, *eating*; past participle, *eaten*. Active voice; indicative mode; past perfect tense; third person, singular number, to agree with its subject *one*. *d) Her* is a simple personal pronoun. Third person; singular number; feminine gender; objective case, object of the participle *killing*.

241. Parse *each* italicized word in the following:
a) And all for what? to occupy an inch of dusty shelf — to have the title of their works read now and then in a future age, by some drowsy churchman or casual straggler like myself, b) "There's John! and there's old Carlo!" cried the happy little rogues.

Ans. a) What is an interrogative pronoun, third, singular, objective case, object of the preposition *for*; *b) inch* is a noun, common, neuter gender, third person, objective case, object of *occupy*; *c) read* is a past participle from the irregular, transitive verb *to read*. Principal parts: *read, read, reading, read*. It modifies *title*. *Myself* is a compound personal pronoun, first, singular, masculine, dative case after the adjective *like*; *Carlo* is a noun, proper, third, singular, masculine, nominative case, subject of *is*.

242. Parse the italicized words in the following:
a, b) Of all wild creatures he is one of the most graceful in action, c) The doe will defend her young, d) A favor-

ite method with the natives is *practised* in winter, and is called by them "still hunting."

Ans. *One* is an indefinite pronoun, third person, singular number, masculine gender, nominative case, predicate nominative to complete the predicate verb *is*. Rule: A pronoun used as a predicate nominative is in the nominative case. *Graceful* is an adjective used as an abstract noun, third person, singular number, neuter gender, objective case, object of the preposition *of*. Rule: A noun used as object of a preposition is in the objective case. *Her* is a simple, personal pronoun (singular number, third person, feminine gender), possessive case, possessive modifier of the noun *young*. Rule: A noun (or pronoun) used as possessive modifier is in the possessive case. Present, *practice*; past, *practised*; present participle, *practising*; past participle, *practised*. *Practised* is a regular, transitive verb, passive voice, indicative mode, present tense, third person, singular number to agree with its subject *method*. Rule: A verb must agree with its subject in person and number.

243. In the following sentence parse *laid*, *herself*; give the part of speech and syntax of *Perceiving*, *empty*, *quietly*: *Perceiving* that grandfather's chair was *empty*, *puss* *laid herself* *quietly* down upon the cushion.

Ans. "Laid," ir. ac. tr. verb; Pres., lay; Past, laid; P. Part., laid; Ind. M., Past T., agrees with subj. "puss" in 3rd. "Herself," comp. per. pron., agrees with antecedent "puss" in 3rd sing., Fem., Obj. case, obj. of laid. "Perceiving," pres. part.; "perceive," modifies "puss;" "empty," descriptive adj., modifies "chair;" "quietly," simple adverb, modifies laid.

244. Analyze by diagram or otherwise the following sentence: *Perceiving* that grandfather's chair was *empty*, *puss* *laid herself* on the cushion.

Ans. Complex declarative sentence. Subj. of princ. clause, "puss;" pred. of princ. clause, "laid;" obj. of princ. clause, "herself." Mod. of subj., pres. act. participle "perceiving;" mod. of obj., the phrase "on the cushion." The subordinate clause is a noun clause. Obj. of act. participle, "perceiving;" subj. of subordinate clause, "chair;" pred. of subordinate clause, "was;" attribute complement, "empty." Mod. of sub., poss. mod., grandfather's. Connective subordinate conjunction, "that," connecting both clauses.

SELECTIONS FOR PARSING.

A.

1 I visited the halls of the Antiquarian Society
 2 and found there, to my infinite gratification,
 3 such a collection of ancient, modern, and
 4 oriental languages as I never before conceived
 5 to be collected in one place; and, sir, you may
 6 imagine with what sentiments of gratitude I
 7 was affected when, upon evincing a desire to
 8 examine some of these works, I was kindly in-
 9 vited to an unlimited participation in all the
 10 benefits of this noble institution. Availing my-
 11 self of the kindness of the directors, I spent
 12 about three hours daily at the hall, which, with
 13 an hour at noon and about three in the even-
 14 ing, made up the portion of the day which I
 15 appropriated to my studies, the rest being
 16 occupied in arduous manual labor.

— *Elihu Burritt.*

The first seven questions refer to the above selection.

1. Classify five subordinate clauses.

Ans. *I conceived*, adjective, relative; *I was affected*, noun clause, object of *may imagine*; *I was invited*, adverbial clause of time; *which made up*, adjective, relative; *I appropriated*, adjective, relative.

2. Give *a*) three modifiers of *found* (line 2); *b*) two of *was invited* (lines 8 and 9); *c*) three, of *spent* (line 11).

Ans. *a*) *There*, adverb; *to gratification*, adverbial phrase; *collection* (noun), object of *found*. *b*) *Kindly*, adverb; *to participation*, adverbial phrase. *c*) *Hours* (noun), object of *spent*; *daily*, adverb; *at hall*, adverbial phrase.

3. Give the syntax of *a*) *as* (line 4); *b*) *sir* (line 5); *c*) *which* (line 12).

Ans. *a*) Relative pronoun, objective case being subject of the infinitive *to be collected*; it refers to antecedent *such*. *b*) Noun, nominative case in direct ad-

dress. c) Relative pronoun, nominative case being subject of *made*; it refers to antecedent *hours*.

4. Give the syntax of a) *before* (line 4); b) *about* (line 12); c) *up* (line 14).

Ans. a) Adverb modifying *conceived*. b) Adverb modifying *three*. c) Adverb modifying *made* (or may be considered as part of the verb *made up*).

5. Give the syntax of a) *evincing* (line 7); b) *being occupied* (lines 15 and 16).

Ans. a) A participle (or gerund), object of the preposition *upon* and, as a verb, governing the object *desire*. b) A participle used, with the noun *rest*, independently.

6. Parse a) *what* (line 6); b) *three* (line 13).

Ans. a) An indefinite limiting adjective modifying the noun *sentiments*; cannot be compared. (May be considered as a double relative pronoun.) b) A cardinal numeral adjective, modifying the noun *hours* understood; cannot be compared.

7. Select two infinitives and give the syntax of each.

Ans. *To be collected*, object of *conceived*. *To examine*, adjective modifier of the noun *desire*.

B.

Whatever may be the *changes* produced by man, the eternal round of the seasons is unbroken. Summer and winter, seed time and harvest, return in their stated order, with sublime precision, affording to man one of the *noblest* of all the *occasions* he enjoys, of proving the high powers of his far reaching mind, in *compassing* the laws that control their exact uniformity, and in calculating their never ending *revolutions*. Centuries of summer suns had warmed the tops of the same noble oaks and pines, sending their heats *even* to the tenacious roots, *when* voices were heard calling to each other in the depths of the forest of *which* the leafy *surface lay* bathed in the brilliant light of a cloudless day in June, while the trunks of the trees rose in gloomy grandeur in the shades beneath.

—J. Fenimore Cooper.

The first *nine* questions refer to the above extract.

1. Select the principal clauses.

Ans. The principal clauses are: *round is unbroken; summer and winter, seed-time and harvest return; centuries had warmed.*

2. Give four modifiers of *occasions*, three modifiers of *surface*.

Ans. *Occasions* is modified by *all, the, he enjoys* and *of proving*. *Surface* is modified by *of which, the, and leafy*.

3. Select three participles and state what each modifies.

Ans. *Produced* modifies *changes*, *sending* modifies *centuries of suns*, and *calling* modifies *voices*.

4. Fully parse *compassing*.

Ans. *Compassing* is a participial infinitive or gerund; regular; principal parts, *compass, compassed, compassing*; transitive; active voice; common form; present tense; objective case, object of the preposition *in*.

5. Select a) an adverbial clause, b) an adjective clause.

Ans. a) *Whatever may be the changes produced by man* is an adverbial clause of concession modifying *is unbroken*. b) *he enjoys* is a relative adjective clause modifying *occasions*.

6. Give the syntax of a) *changes*, b) *revolutions*, c) *even*.

Ans. a) *Changes* is a noun, nominative case, subject of *may be*. b) *Revolutions* is a noun, objective case, object of the participial infinitive, *calculating*. c) *Even* is an adverb of degree modifying the phrase *to roots*.

7. Select a) an intransitive verb, b) a verb in the passive voice, c) a transitive verb in the active voice.

Ans. a) *Return*. b) *Were heard*. c) *Control*.

8. Conjugate *lay* in past tense and past perfect tense, of the indicative mode.

Ans. Past indicative: *I lay, thou layest, he lay, we lay, you lay, they lay.* Past perfect indicative: *I had lain, thou hadst lain, he had lain, we had lain, you had lain, they had lain.*

9. Parse *a) noblest, b) when, c) which.*

Ans. *a) Noblest* is an adjective; descriptive; it describes a noun by denoting some quality; compared, pos. *noble*, comp. *nobler*, sup. *noblest*; superlative degree; attributive, modifies *occasions* understood. *b) When* is an adverb; conjunctive; it connects two clauses and modifies *were heard*. *c) Which* is a pronoun; relative; its antecedent is *forest*; simple; neuter gender, third person, singular number; objective case; it is the object of the preposition *of*.

C.

1 Every productive occupation which adds anything
2 to the capital of mankind, if followed assiduously
3 with a desire to understand everything connected
4 with it, is an ascending stair, whose summit is
5 nowhere, and from the ascending steps of which the
6 horizon of knowledge perpetually enlarges.

4
3
2
1

JAMES ANTHONY FROUDE.

The first six questions refer to the above selection.

1. Classify the following clauses: *a) Occupation is stair* (lines 1-4); *b) which adds* (line 1); *c) if followed* (line 2).

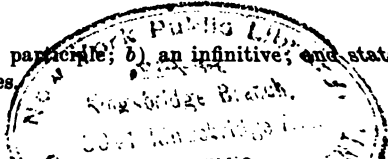
Ans. *Occupation is stair*, principal clause. *Which adds*, subordinate adjective clause. *If followed*, subordinate adverbial.

2. Give *a) four modifiers of stair* (line 4); *b) two modifiers of enlarges* (line 6).

Ans. Four modifiers of *stair*: *An*, article; *ascending*, participial adjective; *summit is*, adjective clause; *horizon enlarges*, adjective clause. Two modifiers of *enlarges*: *perpetually*, adverb; *from steps*, adverbial phrase.

3. Select *a) a participle; b) an infinitive; and state what each modifies.*

7



Ans. Participles: a) *Connected*, modifies *everything*; b) *ascending*, modifies *stair*; c) *ascending*, modifies *steps*. Infinitive: *To understand*, modifies *desire*.

4. Give syntax of a) *occupation* (line 1); b) *stair* (line 4); c) *horizon* (line 6).

Ans. *Occupation*, nominative case, subject of *is*. *Stair*, nominative, attribute of *is*. *Horizon*, nominative, subject of *enlarges*.

5. Parse *which* (line 5).

Ans. *Which* is a relative pronoun, third person, singular number, neuter gender, objective case, governed by preposition *of*. It agrees with its antecedent, *stair*, in person, number and gender.

6. Parse *and* (line 5); *ascending* (line 5).

Ans. *And* is a co-ordinate conjunction connecting the clauses *summit is* and *horizon enlarges*. *Ascending* is an active present participle from the verb *ascend*, and is used adjectively to modify *steps*.

D.

- 1 Build thee more stately mansions, O my soul,
 - 2 As the swift seasons roll!
 - 3 Leave thy low-vaulted past!
 - 4 Let each new temple, nobler than the last,
 - 5 Shut thee from heaven with a dome more vast,
 - 6 Till thou at length art free,
 - 7 Leaving thine outgrown shell by life's unresting sea!
- Oliver Wendell Holmes.

The first six questions refer to the selection given above.

1. Name all the parts of speech in the English language, and in the above selection, locate one example of each.

Ans. Noun, pronoun, verb, adverb, adjective, conjunction, preposition, interjection. *Build*, verb; *thee*, pronoun; *more*, adverb; *stately*, adjective; *mansions*, noun; *As*, conjunction (sub-class conjunctive adverb); *O*, interjection; *at*, preposition. Some writers on grammar are inclined to exclude the interjection, and to recognize only seven parts of speech.

2. Compare all of the descriptive adjectives.

Ans. The positive, comparative, and superlative degrees of the descriptive adjectives are respectively as follows: *stately, more or less stately, most or least stately; swift, swifter, swiftest; low-vaulted* usually is not compared; *new, newer, newest; noble, nobler, noblest; vast, more or less vast, most or least vast; or vast, vaster, vastest; outgrown and unresting* are not compared.

3. Locate, as to mood, tense, and form, all of the verbs.

Ans. *Build*, imperative, present, active, common; *roll*, indicative, present, common; *Leave*, imperative, present, active, common; *Let*, imperative, present, active, common; *is* understood (1. 4) indicative, present, common; *art*, indicative, present, solemn.

4. Find one example of each of the following classes of elements: Independent, adverbial phrase, adverbial clause.

Ans. *Soul*, independent; *at length*, adverbial; 1. 2, adverbial clause.

5-6. Parse: Thee (1); soul (1); as (2); last (4); till (6); leaving (7).

Ans. *Thee* is a personal pronoun; antecedent, *soul*; common, second person, singular, objective case, object of a preposition understood. *Soul* is a noun, common gender, second person, singular, nominative case, independent by direct address. *As* is a conjunction, subordinate, conjunctive adverb; modifies *Build* and *roll*, and joins its clause to *Build*. *Last* is an adjective, definitive, incomparable, limits some term understood. *Till* is a conjunction, subordinate, conjunctive adverb; modifies *Shut* and *art*, and joins its clause to *Shut*. It may be parsed as a preposition taking the following clause as of nounal construction used as its object. *Leaving* is a present participle from the transitive, regular verb *leave*; *leaving* modifies *thou*.

E.

- 1 When simplicity of character and the sovereignty
- 2 of ideas are broken up by the prevalence of second-
- 3 ary desires, the desires of riches, of pleasure, of
- 4 power, and of praise, — and duplicity and falsehood

- 7 to swing itself from one beam in the roof to another,
 8 for the purpose of fixing the line on which it meant
 9 to stretch its web.

— *Sir Walter Scott.*

The first six questions refer to the above selection.

1. Select one principal, two adjective clauses, and two adverbial clauses.

Ans. Principal: *Bruce was looking; attention was attracted.* Adjective: *he lay; which was endeavoring; it meant.* Adverbial: *he was divided; fashion is.*

2. Give the modifiers of *to swing* (line 7), and *to stretch* (line 9).

Ans. a) *Fashion is, itself, from beam, to another, for purpose;* b) *web, on which.*

3. Select a participle used a) as a noun; b) as an adjective.

Ans. a) *Spinning;* b) *hanging.*

4. Select two infinitives and give the syntax of each. Select two verbs in the progressive form.

Ans. *To swing*, adverbial modifier of *was endeavoring*; *to stretch*, object of *meant*. *Was looking*, *was endeavoring*.

5. Give the syntax of a) *what* (line 2); b) *fashion* (line 6) c) *fixing* (line 8); d) *line* (line 8).

Ans. a) Objective case, object of *should do*; b) nominative case, subject of *is*; c) objective case, governed by *of*; d) objective case, object of *fixing*.

6. Select and classify as parts of speech all the words which connect clauses.

Ans. *While* and *as* are conjunctive adverbs; *and* is a conjunction; *which* is a relative pronoun.

GEOGRAPHY.*Political.*

1. Name *a)* the races of mankind; *b)* a people belonging to each race.

Ans. *a)* and *b)* The Caucasian, most Europeans; the Mongolian, the Chinese or Japanese; the Ethiopian, natives of Africa; the Malay, natives of Malay peninsula and the islands of Oceanica; the Indian, natives of America.

2. Mention *three* kinds of government and tell which kind is found in *each* of the following: Japan, Russia, Turkey, France, England.

Ans. Republic, limited monarchy, absolute monarchy. Japan, limited monarchy; Russia, ~~absolute~~ monarchy; Turkey, ~~absolute~~ monarchy; France, republic; England, limited monarchy.

3. *a)* Name the five leading nations of the world. *b)* Give some particular in which each excels.

Ans. Great Britain—excels in commerce and naval power. Russia—excels in population and extent of territory. Germany—excels in perfection of military system and in university education. United States—excels in wealth, prosperity, and rapidity of growth. France—excels in civilization and art.

4. Give three general divisions of the subject of geography and define each.

Ans. Mathematical, physical, and political. Mathematical geography treats of the earth as a planet—its form, size, motions; its divisions by circles; and the art of constructing maps with the aid of those circles. Physical geography treats of the earth in its natural divisions, and its relations to the physical laws by which it is governed. Political geography treats of the earth as divided into countries, and of the condition of the people inhabiting them.

5. Mention *four* colonies belonging to Great Britain; *two* colonies belonging to *each* of the following: France, Netherlands, Denmark.

Ans. Great Britain: Cape Colony, India, British America, Jamaica. France: Algeria, Tunis. Netherlands: Java, Guiana. Denmark: Greenland. Iceland.

6. Give the title applied to the ruler of *a*) Persia; *b*) Japan; *c*) Turkey; *d*) Russia; *e*) Germany.

Ans. *a*) Shah) *b*) Mikado; *c*) Sultan; *d*) Czar; *e*) Kaiser or Emperor.

7. What is the religious faith of the greater part of the people of *a*) India; *b*) Turkey; *c*) China?

Ans. *a*) Brahmanism; *b*) Mohammedism; *c*) Confucianism.

8. Mention four countries outside of Europe in which the Spanish language is principally used.

Ans. Mexico, Honduras, Nicaragua, Costa Rica.

9. Mention an important possession of Holland in *a*) the West Indies; *b*) the East Indies.

Ans. *a*) Curacao. *b*) Java.

10. Where and what is Manchuria? What important railway passes through Manchuria? What port is at the eastern terminus of this railway?

Ans. Manchuria is a province in the northeastern part of the Chinese empire. The Trans-Siberian railroad passes through it. Port Arthur is the eastern terminus of this railroad.

11. Mention four European nations that have possessions in Africa and give the name and location in Africa of one possession of each.

Ans. Algeria in northern Africa belongs to France. Italian Somaliland in eastern Africa belongs to Italy. Cape Colony in southern Africa belongs to Great Britain. Tripoli in northern Africa belongs to Turkey.

12. How many states constitute the United States? Distinguish between a state and a territory. Name and locate two territories and three island possessions of the United States.

Ans. *a*) Forty-six. *b*) A state has local self-government; a territory is ruled by the general government.

c) Arizona, New Mexico, in the southwestern part of the United States. d) Porto Rico in West Indies, north of South America, the Hawaiian islands, in the Pacific ocean southwest of the United States, the Philippine Islands in the Pacific ocean southeast of Asia.

13. Mention *two* British possessions in a) America, b) Asia, c) Africa, d) Australasia. Name *two* British island possessions not included in the above.

Ans. a) Ontario, British Guiana, b) India, Burmah, c) Cape Colony, British East Africa, d) New South Wales, New Zealand. e) Malta, Ireland.

14. Of what political divisions is the German Empire composed? Which political division is the largest? Which of the several rulers is constituted emperor?

Ans. It is composed of twenty-two separate states, three free cities, and the territory of Alsace-Lorraine. Prussia is the largest division and its king is the German Emperor.

15. What and where are the following: Sicily, Berlin, Caspian, Bengal, Sakhalin, Good Hope, Nile, Queensland, Des Moines, Cumberland?

Ans. Sicily, island, off the toe of Italy's boot, in the Mediterranean sea.

Berlin, capital city of Germany.

Caspian, inland sea, southeast of European Russia.

Bengal, great bay of the Indian ocean, indenting Southern India.

Sakhalin, island north of Japan group, just off Asiatic Russia, one-half now belonging to Japan and one-half to Russia.

Good Hope, cape at southern extremity of Africa.

Nile, river of northeastern Africa.

Queensland, northeastern province of Australia.

Des Moines, capital of Iowa.

Cumberland, mountains of Tennessee, Virginia, and Kentucky; also a river of Tennessee and Kentucky.

16. What is meant by the term Eurasia? In which hemisphere is it? What oceans border it? What separates Asia from North America?

Ans. Eurasia is a term referring to Europe and Asia together. Eurasia is in the eastern hemisphere. The Atlantic, Arctic, Pacific, and Indian are bordering

oceans. Behring strait separates Asia from North America.

17. What regions of the earth are uninhabited? Why?

Ans. The ice deserts of the Arctic and Antarctic regions, the rainless deserts of the trade-wind belts, such as the Sahara, Arabian, Australian, and Arizona deserts are uninhabitable for obvious reasons. Some mountain regions, as the Andes and Himalayas, are so high and rough as to make habitation impossible.

18. Mention three European powers that have extensive possessions in Africa. Give the location of the principal possession of each of these powers.

Ans. Great Britain; the possessions are in southern part of Africa. France; its possessions are in western and northern part. Portugal; its possessions are in southeastern part.

19. Locate the country suggested by each of the following names: Cæsar, Hans Christian Andersen, Livingstone, Peter the Great, Napoleon.

Ans. Italy, in southern Europe; Denmark, in north-western Europe; Central Africa; Russia, in eastern Europe; France, in western Europe.

20. Give the location of Hawaii and the Canal Zone; name the principal city and tell something of the government of each.

Ans. *Hawaii* is half-way between San Francisco and Sydney, Australia. The principal city is Honolulu. It is governed by a governor and other officers appointed by the president. Its government is similar to that of territories in the United States. The *Canal Zone* is on the Isthmus of Panama and extends from the city of Panama on one side to that of Colon on the other. It is under the control of the United States. The executive officer is the governor. A canal commission has charge of the work on the canal. The officers are all appointed by the United States government. The principal city is Panama.

Mathematical and Physical.

21. Name three countries in America that are in nearly the same latitude as the Philippine Islands. If

Chicago is about 12° north of New Orleans, how far apart are they in miles?

Ans. Central America, Panama, Venezuela; 830 miles.

22. Describe the trade winds, touching on the regions where they prevail, the directions in which they blow, and their importance to navigation.

Ans. Trade winds blow from about 28° north latitude and south latitude obliquely toward the equator, in the northern hemisphere from the northeast and in the southern from the southeast. They are called trade winds on account of their steadiness and the aid they afford the navigator and consequently to trade or commerce.

23. If the axis of the earth were so inclined as to place the tropics $27\frac{1}{2}^{\circ}$ from the equator, what would be the width of the temperate zones?

Ans. Thirty-five degrees.

24. State *three* conditions that affect the climate of a country.

Ans. Altitude, latitude, proximity of large bodies of water.

25. Show by a diagram the relative position of the sun and earth *a)* March 21, *b)* June 21, *c)* September 21, *d)* December 21.

Ans. (See any standard geography.)

26. Give illustrations to show that places in the same latitude do not always have the same climate. Explain.

Ans. Labrador and British Isles. The climate of the British Isles is made milder by the gulf stream drift.

27. *a)* What is the width of the north temperate zone? *b)* Prove the answer.

Ans. *a)* 43° . *b)* The north temperate zone is the space between the Arctic circle and the tropic of Cancer. The distance from the equator to the north pole is 90° . From the equator to the tropic of Cancer is $23\frac{1}{2}^{\circ}$, and from the north pole to the Arctic circle is $23\frac{1}{2}^{\circ}$. The sum of these is 47° . $90^{\circ} - 47^{\circ} = 43^{\circ}$.

28. How is the climate of the following named countries affected by ocean currents: a) England; b) New Foundland; c) Chili?

Ans. The gulf stream and the North Atlantic eddy unite near the coast of British Isles and thus bring vast quantities of warm water in that section. The westerly winds passing over this water become warmed and give England a mild climate. b) The Labrador current, a cold current passes down along the New Foundland coast and gives that country a cold climate in the winter and a cool climate in the summer. c) The coast of Chili is bathed by the cold current from the south and this gives Chili a cool atmosphere.

29. Of what use are latitude and longitude measurements? In what part of the globe is longitude 93° west, latitude 42° north?

Ans. Latitude and longitude are used in determining relative position on the earth's surface. Ninety-three degrees west, 42° north is a point near Marshalltown, Iowa.

30. Compare the climates of Maine and Washington.

Ans. Maine has abundant rainfall, but short, hot summers and cold, severe winters, and the mean annual temperature is low. Washington has plenty of rainfall and is not subject to extremes. The winters are moderate and the summers pleasant. The latter is suited by reason of its uniform climate to agriculture, while the former is not.

31. Along what lines is latitude measured? Where are degrees of latitude and longitude practically equal?

Ans. Along the equator for places on it, along the parallels for all other places. A degree of longitude on the equator is approximately equal to a degree of latitude at 60°.

32. Just why is the weather colder in winter than in summer?

Ans. During the winter the northern hemisphere of the earth is inclined somewhat from the sun so that the days are shorter and the sunshine weaker, hence the heat lost by radiation during the long nights is greater than that absorbed from the weak sunshine during the short days.

33. State the geographical facts which must be taken into consideration in computing the rate at which a place on the equator moves on account of the axial rotation of the earth.

Ans. The circumference of the earth at the equator and the time required for the earth to make a complete rotation on its axis.

34. What change in the inclination of the earth's axis would be necessary in order that the vertical rays of the sun might reach New York city?

Ans. Forty and one-half degrees.

35. What relative positions on the earth's surface do places occupy which have the same length of day?

Ans. Such places must be located in the same latitude.

36. Define *a*) meridian; *b*) parallel. *c*) What meridian is commonly accepted as the prime meridian? *d*) What may appropriately be called the prime parallel?

Ans. *a*) A great circle on the surface of the earth passing through the poles, or the half of a great circle on the surface of the earth included between the poles. *b*) A small circle on the surface of the earth parallel to the equator. *c*) The meridian of Greenwich. *d*) The equator.

37. *a*) Distinguish between rotation and revolution as applied to the movements of the earth. *b*) What circles of the earth are determined by its rotation?

Ans. *a*) The earth rotates on its axis once in twenty-four hours. It revolves in its orbit once in 365 days. *b*) Equator, meridians, parallels.

38. State approximately *a*) the circumference of the earth, *b*) the diameter of the earth, *c*) the difference between the polar and the equatorial diameter.

Ans. *a*) 25,000 miles; *b*) 8,000 miles; *c*) twenty-seven miles.

39. Mention a case where climate is affected by *a*) an ocean current, *b*) a neighboring range of mountains. Explain in each case.

Ans. England is made warmer than Labrador, which is in the same latitude, by the gulf stream which bathes its shores, and the warm winds from it make the climate warm and moist. The northern part of Italy is protected and made warmer by the mountains, which guard it against the cold winds from the northern part of Europe and stop the warm winds from Africa.

40. a) What is the limit of latitude? b) Why? c) What points on the earth's surface have the same latitude?

Ans. a) The poles. b) Because latitude is distance north or south of the equator, and as the equator is half way between the poles, the north pole must be the limit to the distance north of the equator and the south pole the limit to the distance south. c) All points on the same parallel of latitude.

41. a) What circle or circles mark the boundaries of each zone? b) What determines the location of these circles?

Ans. a) The north frigid zone is bounded by the Arctic circle, the north temperate zone by the Arctic circle and the tropic of Cancer, the torrid zone by the tropic of Cancer and the tropic of Capricorn, the south temperate zone by the tropic of Capricorn and the Antarctic circle, and the south frigid zone by the Antarctic circle. b) The fact that the axis of the earth is inclined $23\frac{1}{2}^{\circ}$ to the plane of its orbit.

42. a) What causes the apparent movement of the sun north and south in the heavens? b) What is the measure of this movement in degrees?

Ans. a) The revolution of the earth around the sun and the inclination of its axis. b) 47° ($23\frac{1}{2}^{\circ}$ to the north and $23\frac{1}{2}^{\circ}$ to the south).

43. Explain by use of a diagram the change of seasons.

Ans. See any standard geography.

44. Make a diagram showing the division of the earth's surface into zones. Indicate the width in degrees of each zone, and give the names of the circles bounding the zones.

Ans. See any standard geography.

45. State three conditions upon which the change of seasons depends.

Ans. Inclination of the earth's axis, revolution of the earth about the sun, parallelism of the earth's axis.

46. Where on the earth's surface are the longest days and the longest nights, twenty-four hours in length?

Ans. Arctic and Antarctic circles.

47. Give two reasons why it is warmer in summer than in winter.

Ans. Because in summer the sun's rays fall more nearly perpendicularly, and the days are longer.

48. How does the climate of England compare with that of Siberia in the same latitude? Why?

Ans. The climate of England is moist, equable in temperature, and not subject to sudden storms. This climate results from the insular position of the British Isles and from the influence of the gulf stream. Siberia is exposed to sudden storms of violent fury, experiences quick changes of temperature, and is withal an example of extreme continental climate.

49. What is "standard" time?

Ans. Standard time is the time of the four great meridians of longitude which cross our country one hour apart. The times of these meridians have been adopted in these respective belts to avoid the inconvenience of a constant correction of local times in civil and commercial activities.

50. What determines the width of the zones?

Ans. The inclination of the earth to the plane of its orbit determines the width of the zones.

51. What and where is the international date line?

Ans. The international date line is an imaginary line drawn, somewhat irregularly, north and south through the Pacific ocean in such a way that the islands to the east of it bear the same date as the United States and those west of it the same date as Japan and Australia.

52. From what meridian do nearly all nations reckon longitude?

Ans. From the meridian of Greenwich, England.

53. Account for differences in temperature, in the same latitude, between places of different elevation.

Ans. In the same latitude there may be valley land and plateaus. The higher we go the colder it gets, the reason being that as we go higher the atmosphere gets lighter and sun rays pass through without heating the light or thin air to such an extent as the heavier air in the valley land.

54. What inclination of the earth's axis would locate the polar circles where the tropics now are?

Ans. Sixty-six and one-half degrees.

55. What three conditions largely determine the temperature of a locality?

Ans. Latitude, altitude, proximity to large bodies of water or to mountain ranges.

56. Why are the days longer than the nights south of the equator during our winter months?

Ans. Whatever proportion of a parallel of latitude is lighted by the sun, the same proportion of twenty-four hours will be daytime. During our winter the sun is south of the equator, therefore more than half of the southern hemisphere is illumined, and more than half of each parallel of the southern hemisphere is illumined. It is therefore light during more than half of each twenty-four hours, causing longer days than nights.

57. a) On what parallel do the vertical rays of the sun strike the surface of the earth June 21 (summer solstice)? b) Account for the inequality in the length of day and night now existing.

Ans. a) Tropic of Cancer. b) The sun is now south of the equator, and therefore less than half of the northern hemisphere and of each parallel in the northern hemisphere is illumined. Less than half of each twenty-four hours is therefore daytime and more than half night.

58. In what zones is a) Asia; b) Africa?

Ans. a) North frigid, north temperate, torrid. b) North temperate, torrid, south temperate.

59. During what month does the long day begin at a) the north pole, b) the south pole? Which side of an east and west street of Buenos Ayres is the sunny side?

Ans. June. September. South side.

60. On what grand divisions are places that are situated as follows: 30° E. and 60° N., 44° W. and 23° S., 115° E. and 40° N.?

Ans. Europe, South America, Asia.

61. Give the latitude of the Tropic of Capricorn and of the Arctic circle.

Ans. Tropic of Capricorn, 23½° South latitude; Arctic circle, 66½° North latitude.

62. What causes the sun in this latitude to approach the zenith in June and to sink toward the southern horizon in December?

Ans. The inclination of the earth's axis and the annual revolution of the earth about the sun.

63. Show a) how the Alps affect the climate of Italy; b) how the Andes affect the climate of Chili.

Ans. a) The Alps protect Italy from the northern winds, making the climate warmer than it otherwise would be. b) The Andes perform a like service for Chili.

64. Locate by giving its latitude and longitude, a place half way from the equator to the north pole and one-fourth the distance around the earth east from the prime meridian.

Ans. 45° north latitude; 90° east longitude.

65. Name three conditions which largely determine the temperature of a locality. b) Select a locality which particularly illustrates each answer.

Ans. a) Latitude, altitude, ocean currents. b) Key West, Denver, San Francisco.

66. If the inclination of the earth's axis were 40 degrees from a perpendicular to the plane of its orbit, what would be the width of the torrid zone?

Ans. 80 degrees.

67. What causes determine the width of the torrid zone?

Ans. Inclination and unvarying direction of the earth's axis, with its revolution about the sun.

68. Which is farther north, St. Petersburg or Montreal? Rome or Washington, D. C.? Paris or New York city? Vienna or Chicago?

Ans. St. Petersburg, Rome, Paris, Vienna.

69. What is the inclination of the earth's axis from a perpendicular? From this fact compute the width of each of the zones in degrees.

Ans. $23\frac{1}{2}$ degrees. The torrid zone is 47 degrees in width. The temperate zones are each 43 degrees in width. The frigid zones are each $23\frac{1}{2}$ degrees in width.

70. Mention the *two* motions of the earth and give the principal result of each.

Ans. The two motions of the earth are the revolution of the earth around the sun and the rotation of the earth upon its axis. The result of each is the change of season and day and night.

71. Mention *two* methods of describing the location of a place. Illustrate by giving, according to each method, the location of *one* of the following: Boston, Albany, Chicago, New York

Ans. By latitude and longitude; by association with natural features. Boston, $40^{\circ} 30'$ north latitude, 71° west longitude; Boston is located on the eastern border of Massachusetts on Massachusetts Bay.

72. When it is 12 M. at New York, by standard time, what is the time at a) New Orleans, b) Chicago, c) San Francisco.

Ans. a) 11 a. m. b) 11 a. m. c) 9 a. m.

73. *a)* Which is shorter and by how much, the equatorial or the polar diameter of the earth? *b)* Why cannot this be accurately represented on artificial globes?

Ans. *a)* Polar diameter by about twenty-six miles. *b)* On account of smallness of artificial globes as compared with the size of the earth, the difference in the length of the diameter cannot be accurately represented.

74. Through what countries of South America does the meridian of Washington pass?

Ans. Colombia, Ecuador and Peru.

75. *a)* What parallel forms a portion of the northern boundary of this State? *b)* What is the longitude of New York city?

Ans. *a)* 45° N. L. *b)* 74° west from Greenwich or 3° east from Washington.

76. *a)* What is meant by prime meridian? *b)* Explain how any point on the earth's surface may be exactly located by latitude and longitude.

Ans. *a)* The meridian from which longitude is reckoned. *b)* Longitude is distance east or west measured from the prime meridian, latitude is distance north and south measured from the equator; therefore the latitude of a place shows that it is on a circle at a certain distance from the equator, its longitude shows its exact position on this circle.

77. State approximately *a)* the latitude of the Hawaiian Islands; *b)* the direction and distance of these islands from San Francisco.

Ans. *a)* 20° N.; *b)* 2,100 miles southwest from San Francisco.

Physical.

78. Describe *each* of the following rivers by telling where it rises, the direction in which it flows, the country or countries through which it passes and the body of water into which it empties: Danube, Ganges, Zambesi.

Ans. The Danube rises in the Black Forest in southern part of German Empire, flows easterly through Austria and southeasterly through Hungary, along the boundary between Hungary and Servia and between Roumania and Bulgaria, and thence through Roumania into the Black sea.

The Ganges rises in northern Hindustan in the Himalaya mountains and flows southeasterly through Hindustan into the Bay of Bengal.

The Zambesi rises in Angola in southwestern Africa, flows easterly between British Central Africa and British South Africa and through Portugal East Africa into the Mozambique channel.

79. Locate two principal rainless regions of the earth and give reasons therefor.

Ans. A lowland extending from about six degrees south of the tropic of Cancer to about four degrees north of that tropic across Africa is called the Sahara Desert, and is caused by the drying action of the warming air of the trade winds which blow over it. Peru is rainless because the northeast and southeast trades are intercepted by the lofty Andes and deposit all their moisture on the eastern Andean slopes.

80. Show how climatic conditions and physical environment affect the life of a people.

Ans. A cold climate begets need for and invention of clothes, fuel, and strengthening and fattening foods. Residence near the sea makes fish eaters, sailors, and those who engage in commerce, while on fertile inland plains agriculture is followed. The extremes of either heat and cold do not leave sufficient leisure or energy for the civilizing and humanizing professions, arts and trades of life.

81. Draw an outline map of the British Isles, and indicate the political divisions of Great Britain. Locate on this map Edinburgh; the Mersey river; Belfast.

Ans. See map.

82. Discuss importance of mountains, as, a) Barriers. b) With reference to mineral products. c) With reference to scenic attractions. Name and locate a range of mountains which is an example of each.

Ans. Mountains are so important in the way of barriers that they may cause the people on different sides to be entirely different in customs, government and occupation, while plants and animals are often of entirely different kinds, etc., the Himalayas. The minerals found in mountains are usually brought up from the earth's depths by uplifts of igneous rock forming the mountain cove which becomes exposed and accessible by erosion. Most of the metals are found in mountain regions. The Black Hills and various ranges of the Rocky mountains are good examples. Mountains attract people and give them recreation and health by the diversity of scenery. Here are the lofty peaks, steep slopes, roaring waterfalls, beautiful valleys, lakes and possibly glaciers; as an example of scenic mountains the Alps are well known.

83. What is a river system, a basin, a water shed? Upon what does the volume of a river depend?

Ans. a) The great stream and all its tributaries; b) The land drained; c) The great divide which sends streams and systems in each direction forms its apex. d) Upon the extent of territory drained.

84. Name and locate four large portions of the earth's surface which are uninhabited and give the reasons for the lack of population.

Ans. a) The desert of Sahara; b) The Bad Lands of the Dakotas; c) The desert of Arabia; d) Greenland, north. The climatic conditions are such that life cannot exist in these places.

85. What and where is Titicaca; Kimberley; Odessa; Mackenzie; Shasta?

Ans. Titicaca, a lake in western South America; Kimberley, the site of the great diamond mines in South Africa; Odessa, a city in southern Russia; Mackenzie, a river in northern North America; Shasta, a mountain in northern California, a great volcanic cone.

86. Tell what is meant by 1) the equator, 2) the relief of a country, 3) a metropolis, 4) a capital.

Ans. 1) Equator is the imaginary great circle on the earth's surface, everywhere equally distant from the two poles and dividing the earth's surface into two hemispheres. 2) The elevations and surface undula-

tions of a country are called its relief. 3) **Metropolis** is the chief city of a country. 4) **Capital** is the seat of government of a country or state.

87. Describe briefly *four* of the following: The Nile delta, the cañon of the Colorado, a glacier, **Vesuvius**, the Great Wall of China, the St. Gotthard tunnel.

Ans. The Nile delta, at its outlet into the Mediterranean, occupies an area of nearly 9,000 square miles. The sediment of the river, deposited over the flood grounds mostly during inundations, makes this region one of the most fertile in the world.

The Colorado river in its course through Arizona runs for 300 miles in a deep cañon which is one of the most wonderful objects in North America. Its rocky walls rise from one thousand to several thousand feet in height.

Glaciers are ice streams, or rivers of ice. They have their source in high mountains and descend along the valleys.

Vesuvius is a celebrated volcano on the Bay of Naples, Italy. It rises to the height of 3,948 feet above sea level.

The Great Wall of China was built 220 B. C. as a protection against the Tartar tribes. Its length is 1,250 miles; height, 20 feet; thickness at the base, 25 feet, and at the top, 15 feet.

The St. Gotthard tunnel is constructed through the St. Gotthard mountains. It is nine miles long, extending from Andermatt to Airola.

88. What are monsoons? Locate the greatest monsoon region of the world.

Ans. Monsoons are winds which blow in a certain direction during half of the year and in an opposite direction during the other half of the year. They prevail on the western coasts of continents and in the temperate zones. The principal monsoon region is in the Indian Ocean.

89. Account for the presence of the icebergs and dense fogs off the coast of Newfoundland.

Ans. The icebergs off the coast of Newfoundland are brought down by the Arctic current. The fogs which prevail off the coast of Newfoundland are caused by the meeting of the cold Arctic current with the warm waters of the Gulf Stream.

90. Define: equator, watershed, canyon, prime meridian.

Ans. The equator is an imaginary line drawn around the earth midway between the poles.

A watershed is a piece of land higher than the surrounding land, which prevents water from one river system from flowing into that of another. It is generally formed by hills or mountains.

A canyon is a deep, narrow valley having steep and generally rough sides.

A prime meridian is a chosen line running north and south at right angles with the equator upon or from which degrees of longitude are based.

91. Give a general discussion upon the formation of mountains.

Ans. Mountains are formed by the shrinking of the earth's crust, in consequence of the cooling of the earth. During the Glacial Period mountains were worn by glaciers passing over them and deep gorges were cut in the same manner. Volcanic action had its effect also in the building up of mountains.

92. Explain the formation of clouds. Of frost. Of coal.

Ans. Clouds are formed by evaporation causing water from the earth to pass into the air in shape of invisible vapor. When the dew point is reached in the air, this vapor becomes visible by its forming into minute drops. Whenever this visible formation is in the higher regions of the air, clouds are formed. Whenever an object on the earth has a temperature below 32 degrees Fahr. the dew that has collected upon it freezes into crystals which is called hoar-frost. Coal is formed by vegetable matter decaying under water. Coal is composed mostly of carbon, vegetable matter is composed of hydrogen, oxygen and carbon. When such matter is decomposed under water, the carbon is retained, most of the oxygen and hydrogen is liberated and coal is formed.

93. What and where are the following: Baikal, Durango, Katahdin, Yukon, Bosphorus, Leeds, Fundy, Quincy, Yucatan, and Bahia?

Ans. Baikal, a lake in Siberian Asia.

Durango, a State in the Republic of Mexico and a city in the State of Colorado, United States.

Katahdin, a mountain in Maine.

Yukon, river of Alaska and British America.

Bosphorus, strait connecting the Black and Marmora Seas in Europe.

Leeds, manufacturing town in York county, England.

Fundy, bay between New Brunswick and Nova Scotia.

Quincy, towns, or cities, in Illinois, Massachusetts, and Michigan bear this name.

Yucatan, a peninsular state of Mexico.

Bahia, State of Brazil.

94. Locate two great desert regions and explain specifically the causes of each.

Ans. *Sahara* — Lowlands of equatorial Africa over which the trade winds blow taking up moisture as they grow warmer. The ground is not infertile, but is lacking in moisture.

Peruvian — Slope and lowland to the leeward of lofty mountains.

95. Discuss rising and falling coast-lines.

Ans. The bottom of the sea is much smoother and more nearly level than is the surface of the land. So when the coast is rising the coast line is comparatively even and regular. Consequently, the reverse is true, a sinking coast is irregular, broken by bays and peninsulas, and generally fringed with islands. The northern parts of North America's Atlantic coasts are irregular and are sinking; the Pacific coast of the same continent is quite even and regular and is rising.

96. Name and locate the two extremes of elevation found in the study of the relief forms of the continents.

Ans. Mt. Everest and Dead Sea.

97. What are glaciers? Locate two well-known glacial fields.

Ans. Glaciers are vast fields of snow and ice formed in the regions of perpetual snow, and move very slowly down the mountain slopes. The principal glacier regions are in the Alps, Norway, Spitzbergen, Greenland and Alaska.

98. Define delta, and explain how deltas are formed.

Ans. The delta of a river is the land formed at its mouth between the different channels through which the water of such river is discharged. The deltas are formed by alluvial deposits being carried down the river

and deposited at the mouth of the river, where the force of the water is not sufficient to wash away such deposits.

99. Define *a)* mountain system; *b)* mountain chain; *c)* plateau Name and give location of an example of each.

Ans. *a)* Several more or less parallel and connected chains with their intervening valleys. As the Rocky Mountain system in the western part of North America. *b)* A fold or wrinkle of the surface of the earth, or a connected series of mountains extending in the same general direction, as the Sierra Nevada mountains in California. *c)* A large area of elevated land, as the Mexican plateau in the western part of North America.

100. Locate a rainless region in Africa and in Asia; state why each is rainless

Ans. *Sahara* — Northern part of Africa — lies in the track of the northeastern trade winds which blow from the dry plains of Central Asia. *Gobi* — Central part of Asia The winds on this desert come over the Himalaya mountains and are robbed of their moisture before reaching the Gobi.

101. Name two oceans currents and trace the course of each.

Ans. Gulf stream starts in Gulf of Mexico, flows northeast into Arctic ocean north of Europe; equatorial current starts in the Pacific ocean near South America, flows west near Australia into Indian ocean, west through Atlantic ocean to coast of America.

102. Define *each* of the following and give an example of each: Promontory, isthmus, river system, strait.

Ans. A rocky headland or body of land projecting into the water. Monaco in the southeastern part of France. An isthmus is a narrow neck of land connecting two larger bodies of land. Panama. A river system is a river with all its branches. Mississippi. A strait is a narrow strip of water connecting two larger bodies of water. Gibraltar.

103. Mention *two* animals that furnish the principal supply of ivory and state where each is found,

Ans. Elephant: In Africa and Asia. Walrus: In Arctic ocean and Greenland.

104. What and where is *each* of the following: Luzon, Novgorod, Bosphorus, Sardinia, Loire?

Ans. Luzon: An island in the Philippine group, south of Asia. Novgorod: A city in eastern part of Russia on Volga river. Bosphorus: A strait in south-eastern part of Europe and connects Sea of Marmora and Black sea. Sardinia: An island in the Mediterranean sea, west of Italy. Loire: A river in the western part of France.

105. Distinguish between *a*) a river basin and a river system; *b*) a mountain range and a mountain system?

Ans. *a*) A river and all its branches forms a river system. The land drained by such a river system is called a river basin. *b*) A high and rugged ridge of mountains, or several such ridges near one another, may be called a mountain range. A number of ranges having the same general direction in one highland form a mountain system.

106. What is *a*) a glacier; *b*) a watershed; *c*) a river system? *d*) Locate one of each.

Ans. *a*) A glacier is a vast stream of ice which descends from the lower edge of the perpetual snows; *b*) the line of separation between adjacent basins, from which the streams flow away in opposite directions; *c*) a river system drains all the land which forms it basin. *d*) The Mer de Glace in Switzerland, the Muir glacier in Alaska; the Rocky mountains and Appalachian mountains are watersheds; the Mississippi river system. (Other answers accepted.)

107. Mention, with location, *two* important rivers of China, *one* important city of India, *one* seaport of Germany, *one* important range of mountains in Russia.

Ans. Yang-ste-Kiang, southeastern part of China, flows eastward into the Yellow sea; Hoang-Ho, east central part of China, flows into Yellow sea. Calcutta, at the mouth of Ganges river. Hamburg, at mouth of Elbe river. Ural mountains, on the Western Siberia border.

108. Describe *three* of the following: Kongo river, Lake Victoria Nyanza, Sumātra, Tugela river, Himalayas, Azores.

Ans. Kongo river rises in the southeastern part of Kongo Free State and flows northwest and thence southwest into the Atlantic ocean. Lake Victoria Nyanza, eastern part of Africa, east of Congo Free State, second largest fresh water lake in the world; one of the sources of the Nile river. Sumatra, southwest of the Malay peninsular.

109. a) Locate the Philippine islands; b) name the largest two islands; c) the capital city; d) two leading exports.

Ans. a) Southeast of Asia, between 5° and 19° N. lat. and 117° and 120° E. long.; b) Luzon and Mindanao; c) Manila; d) sugar, hemp, indigo, tobacco.

110. State the locality in which *each* of the following is found wild, and mention *one* interesting fact regarding each: Beaver, seal, walrus, grizzly bear, moose.

Ans. All found in Canada, Alaska and Northwestern States. Beaver cuts down timber with teeth, builds dams and houses. Seal is valued for the fur. Walrus furnishes meat and clothing for the Esquimaux. Grizzly bear is the most ferocious of the bear family. Moose has beautiful antlers.

111. Describe *two* of the following: Native Patagonians, Fuegians.

Ans. Patagonians are tall and muscular Indians, live by herding and hunting. Fuegians are one of the lowest tribes of human creatures in the world. They live like animals.

112. Give the location of *each* of the following and mention *one* important fact concerning each: Luzon, Guam, Kimberley, Cape Town, Peking.

Ans. Luzon is situated southeast of China in the Pacific ocean. It is the largest of the Philippine islands. Guam is situated northeast of the Philippine islands in the Pacific ocean. It is used by the United States as a coaling station and cable landing. Kimberley is in the western part of the Orange Free State. It is noted for its diamond mines. Cape Town, south-

western part of Cape Colony, on Table Bay. It contains splendid botanical gardens. Peking, eastern part of Chinese empire, on Picho river. It is divided into two parts. One part is called the Tartar City.

113. Write an account of *one* of the following, touching on *a*) location, *b*) climate, *c*) chief agricultural products, *d*) kind of government, *e*) character of people: Hawaii, Santo Domingo, New Zealand.

Ans. Hawaii is 2,000 miles southwest of San Francisco, in the Pacific ocean and north temperate zone, the climate is temperate and delightful. Chief agricultural products are sugar cane, coffee and roots. The government is in the hands of the Americans. It was ceded to the United States in 1898. The people are civilized, good natured and progressive.

114. Name the six great land divisions of the earth in the order of *a*) area; *b*) population.

Ans. *a*) Asia, Africa, North America, South America, Europe, Australia; *b*) Asia, Europe, Africa, North America, South America, Australia

115. Which grand division of land has the most *a*) regular coast line; *b*) irregular coast line? *c*) How do these conditions affect the wealth and power of the people?

Ans. *a*) Africa; *b*) Europe; *c*) An irregular, deeply-indented coast line is favorable to navigation. The intercourse with other nations and the commerce with them which this brings teaches a people, and also brings wealth. The harbors also afford shelter for building and keeping ships of war, and this makes a nation powerful. For these reasons Europe is wealthier and more powerful than Africa.

116. Locate by province or colony *a*) Sydney; *b*) Melbourne; *c*) Johannesburg; *d*) Cape Town.

Ans. *a*) New South Wales; *b*) Victoria; *c*) South African Republic; *d*) Cape Colony.

117. Give the name and the location of the state sometimes popularly called *a*) Green Mountain State, *b*) Keystone State, *c*) Lone Star State. State the reasons for the popular name in each case.

Ans. a) Vermont, called Green Mountain State from the mountain range. b) Pennsylvania, called the Keystone State. c) Texas, called the Lone Star State from the fact that Texas was once an independent State.

118. What and where is *each* of the following: Yukon, Yucatan, Baltic, Rhone, Korea?

Ans. a) Yukon is a river. It's in the northwestern part of North American and empties into the Behring strait. b) Yucatan is a peninsula projecting from the southeastern part of Mexico into the Atlantic ocean. c) The Baltic sea lies between Russia and the Scandinavian peninsula. d) Rhone is a river. It rises in Switzerland and flows west and then south into the Gulf of Lyons. e) Korea is a peninsula in the eastern part of Asia and projects into the Japan sea.

119. Describe *three* of the following: Mersey river, Firth of Forth, Jersey island, Shannon river, Land's End, Grampian hills.

Ans. Jersey Island is south of England in the English channel and is one of the Channel islands. Land's End is in the southern part of Ireland and is a cape. The Firth of Forth is in the northeastern part of Scotland and is an estuary.

120. Describe *three* of the following: Sierra Nevada mountains, Blue Ridge mountains, Great Salt lake, Columbia river, Georgian bay, Cape Cod.

Ans. a) Great Salt Lake is in the northwestern part of Utah, near the lake is built Salt Lake City, which is the capital. b) The Columbia river rises in the southern part of British Columbia and flows south and then west into the Pacific ocean. This river is noted for its salmon fisheries. c) Cape Cod is a cape projecting from the southeastern part of Massachusetts into the Atlantic ocean.

121. Define tundras, alfalfa, llama, steppes, estuary.

Ans. *Tundra* is the Russian name for the extensive, low-lying, swampy, peat-moss bogs which compose much of the surface of Siberia and of northern Russia. *Alfalfa* is a herbaceous plant introduced early into Europe and America from Asia. The hardy qualities and adaptability of alfalfa make it the most valuable forage crop of the United States. The *llama* is an animal, native to South America, which has been domes-

ticated as a beast of burden. *Steppe* is a Tartar term, used in Russia to designate the region around the Black and Caspian seas, between the Ural and Altai mountains. The large, roughly funnel-shaped bays, formed by the slowly-sinking shoreline at river mouths, are called *estuaries*.

122. Mention six cities of more than 100,000 inhabitants, situated on the Great Lakes; four on the Mississippi river.

Ans. *a)* In order: Chicago, Cleveland, Buffalo, Detroit, Milwaukee, Toronto. *b)* In order: St. Louis, New Orleans, St. Paul, Minneapolis, Memphis.

123. What and where is each of the following: Borneo, Adelaide, Aconcaugua, Ebro, Deccan?

Ans. Borneo, the largest island crossed by the equator, lies to the north of Australia. Adelaide is the capital and chief seaport in South Australia. Aconcaugua is an extinct volcano in the Chilean Andes. The Ebro is a river in northern Spain. Deccan is a plateau lying in southern India, and bordered east and west by the Ghats mountains.

124. Name the chief ocean currents and show how each modifies the climate of some coastal belt.

Ans. Atlantic Equatorial—flowing westward between the shores of Africa and South America, divides into the Brazil current which warms the eastern South American coast, and into the gulf stream which moderates the climate of eastern North America to Labrador and Northwestern Europe, the British Isles, and other islands far into the Arctic ocean, and turning south, a branch of it performs the same office for Western Europe and Northwestern Africa.

Atlantic Arctic comes down on either side of Greenland, unites at southern extremity of that island-continent and renders the North American coast as far south as Grand Banks barren and frigid.

Atlantic Antarctic—throws the same flow of icy waters upon the southwest coast of Africa.

Pacific Equatorial—flowing westward divides into the Australian current which bathes the shores of Australia and is lost in the Antarctic, and into the Japanese current which makes tropic the archipelago southeast of Asia and temperate China and Japan, it then flows northeast making warm the climate of the Aleutian Islands, Alaska, and western North America.

Pacific Arctic—a small current flows through Behring strait between the Japanese current and the eastern shores of Asia.

Pacific Antarctic—the Humboldt current carries its cool waters along the west shores of South America from Patagonia to the Galapagos Islands.

Indian Equatorial—is a branch of the Pacific equatorial which washes the south shores of Asia. After passing Cape Comorin it turns southwest and warms eastern coasts of Africa as the *Mozambique current*.

Indian Antarctic—a current sets northwestward, passes to the southward of Australia and pours its icy floods into the Indian ocean.

125. Name in order of size the three largest of the grand divisions of land.

Ans. Asia, Africa, North America.

126. Why are there so few large rivers flowing into the Pacific ocean?

Ans. Because in North and South America mountain ranges are too near to the Pacific coast to allow the formation of large rivers.

127. Give the name of each of the four bodies of water between Africa, and Europe and Asia.

Ans. Strait of Gibraltar, Mediterranean sea, Red sea, Strait of Bab-el-Mandeb.

128. a) Where does the Susquehanna river rise, and b) into what does it flow? c) Name two cities located upon it.

Ans. a) Otsego county, New York State; b) Chesapeake bay; c) Binghamton, Harrisburg.

129. Locate each of the following cities and tell for what it is noted: a) Sheffield; b) Glasgow; c) Lynn; d) Canton; e) Batavia.

Ans. a) Northern part of England; noted for cutlery. b) Southwestern part of Scotland, on the Clyde river; noted for building steamships. c) Eastern coast of Massachusetts; noted for manufacture of boots and shoes. d) Southeastern part of China, on the Li Kiang; noted as a commercial seaport. e) On the island of Java; noted as the capital of the Dutch East Indies and for the export of coffee.

130. Give the principal or predominant mountain system in each of the five grand divisions.

Ans. North America — Rocky; South America — Andes; Europe — Alps; Asia — Himalaya (Hindoo Kush or Armenian); Africa — Abyssinian; Australia — Australian Alps or Blue mountains.

131. Tell what rivers drain the following lakes and name the body of salt water into which each river empties: Otsego, Moosehead, Victoria Nyanza, Geneva, Winnipeg.

Ans. Susquehanna, Chesapeake bay; Kennebec, Atlantic ocean; Nile, Mediterranean sea; Rhone, Gulf of Lyons; Nelson, Hudson bay.

132. What political divisions are separated in part by *a*) the Pyrenees, *b*) the Southern Andes, *c*) the Himalayas, *d*) St. George's channel, *e*) the Savannah river?

Ans. *a*) France and Spain, *b*) Chile and Argentina, *c*) Chinese Empire and Hindostan, *d*) Ireland and Wales, *e*) South Carolina and Georgia.

133. Tell where each of the following animals is found, and state why each is valuable: Llama, chamois, whale, reindeer, ostrich.

Ans. South America, beast of burden; Europe, soft leather; North Atlantic and Pacific, whale oil and bone; Lapland, food, clothing, and beast of burden; South Africa, plumage.

134. Locate and describe *a*) the prairies, *b*) the tundra, *c*) the steppes.

Ans. *a*) Prairies are open, grassy plains. They are located in the central portion of the great central plains of the United States. *b*) The tundra is a treeless, swampy region covered with coarse moss and lichens. They are located on the Arctic coast of Russia. *c*) The steppes are great plains located in the southwestern Asiatic Russia and in southeastern European Russia.

135. Name a city in each of the following river valleys, and tell something interesting about each city named: Rhine, Danube, Nile, Chemung, Connecticut.

Ans. Cologne, noted for its cathedral; Vienna is the capital of Austria-Hungary; Cairo, the capital of Egypt, is the largest city in Africa; Elmira is the seat of Elmira College for Women; Springfield contains a United States arsenal.

136. Name in order the states and larger rivers that one would cross in going from Boston to Richmond, Va.

Ans. Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia. Rivers crossed: Connecticut, Hudson, Delaware, Potomac.

137. Name a large island or group of islands lying southeast of *a*) North America; *b*) South America; *c*) Asia; *d*) Africa; *e*) Australia.

Ans. *a*) West Indies; *b*) Falkland Islands; *c*) Borneo; *d*) Madagascar; *e*) New Zealand.

138. Mention two peninsulas that form a part of the territory of Mexico and the bodies of water that touch the shores of each.

Ans. Lower California — Gulf of California and Pacific ocean. Yucatan — Gulf of Mexico, Yucatan channel, Bay of Honduras, Bay of Campeche.

139. Locate the following cities and state for what each is noted: *a*) Edinburgh; *b*) Venice; *c*) Athens; *d*) Rio Janeiro.

Ans. *a*) Edinburgh is in the southwestern part of Scotland, and is noted for its literary institutions. *b*) Venice is in the northeastern part of Italy on the Adriatic sea, and is built entirely on islands. *c*) Athens is in the eastern part of Greece, and is remarkable for its ruins, works of art, and historical associations. *d*) Rio Janeiro is in the northeastern part of Brazil. It has one of the best harbors in the world and is the largest coffee market in the world.

140. Name an important city *a*) in the Danube basin; *b*) on the Seine; *c*) on the Elbe; *d*) on the Ganges; *e*) on the Black sea.

Ans. *a*) Vienna; *b*) Paris; *c*) Hamburg or Dresden; *d*) Calcutta; *e*) Odessa.

141. In what country and on or near what water is each of the following cities: *a*) Vienna; *b*) Athens; *c*) Madras; *d*) Montevideo?

Ans. *a*) Austria, on the Danube. *b*) Greece, Ægean sea. *c*) India, Bay of Bengal. *d*) Uruguay, mouth of Rio de la Plata.

142. Locate the following and state for what each is noted: *a*) Mt. Etna; *b*) the Sea of Galilee; *c*) Richmond.

Ans. *a*) Active volcano, Sicily. *b*) Palestine, Asiatic Turkey, noted in Bible history. *c*) Eastern Virginia, capital Southern Confederacy.

143. *a*) Name a German city noted for its cathedral. *b*) Name the countries of Europe bordering on the Mediterranean sea.

Ans. *a*) Cologne. *b*) Spain, France, Italy, Austria, Hungary, Turkey, Greece.

144. Give the name and location of *five* noted volcanoes. Name *one* noted eruption of recent occurrence.

Ans. Mount Vesuvius, in the western part of Italy, near Naples. Mt. Etna, in Sicily. Mt. Pelee, on the Island of Martinique, one of the Lesser Antilles. Chimborazo, in the eastern part of Ecuador. Cotopaxi, in the eastern part of Ecuador. Mt. Pelee is noted for a recent eruption that destroyed the town of St. Pierre.

145. Describe *three* of the following: Columbia river, Puget Sound, Pike's Peak.

Ans. Columbia river rises in the Rocky mountains of British Columbia, flows through western and central Washington to the southern boundary, thence flows westward into Pacific ocean, forming the boundary line between Washington and Oregon. Puget Sound indents the northwestern coast of Washington. Pike's Peak is in central Colorado, near Cripple Creek gold mines and Colorado Springs.

146. Describe *three* of the following: Nile river, African diamond fields, Madagascar, the Transvaal.

Ans. Nile river is the outlet of Lakes Victoria and Albert Nyanza; flows through Egypt, fertilizing the

valley at certain seasons of the year. The African diamond fields are located in southern part, in the South African Republic and Orange Free State principally. The Kimberly mines are the most famous. Madagascar, the largest island of Africa, near the southeast coast, mountainous but fertile, belongs to France. The Transvaal, a name given to the country inhabited by the Boers, across the Vaal river.

147. Describe *five* of the following: Danube river, Strait of Gibraltar, Dardanelles, Corsica, Pyrenees mountains.

Ans. The Danube river rises in southern Germany and flows through the central part of Austria-Hungary and through Roumania and Bulgaria, emptying into the Black sea; second longest river in Europe; navigable for 600 miles. Strait of Gibraltar separates Morocco from Spain and connects the Atlantic ocean with the Mediterranean sea. The Dardanelles connects the Ægean sea with the sea of Marmora. Corsica is an island southeast of France and west of Italy; Napoleon Bonaparte was born there. The Pyrenees mountains form the boundary line between France and Spain.

148. Give *three* examples of mountain ranges parallel to coast lines and one not so situated. What reason is given for this general parallel position?

Ans. Sierra Nevada, Coast Range, Appalachian, Andes, Ural, Pyrenees, Carpathians. (Other examples may be given.)

Most mountains are supposed to have been formed by the strain produced by the slow cooling of the interior of the earth. The lateral pressure exerted from the ocean bedside acted at an angle to the direction of the forces exerted by the continental areas, and consequently the folding was along axes parallel to the coast lines.

149 Compare North America with South America, noting similar features of form, elevation, and drainage.

Ans. North America and South America are similar in that each have *a*) a general triangular form with the apex to the south, *b*) a general trend to the northwest to the predominant mountain system in the west, the secondary mountain system in the east, and the great low plain between the two systems, *d*) their drainage to a great extent performed by rivers that flow into the Atlantic ocean or its tributaries.

Ans. a) In Kamchatka and the islands of Kurile, Japan, Formosa, Philippine, Molucca, Australia, New Guinea, New Britain, New Hebrides and New Zealand, and southern Europe. b) In the region of the Andes, Sierra Nevada, and Cascade mountains, Central America, Mexico, Alaska, and the Aleutian islands.

159. a) What is a glacier? b) Give the location of three regions where glaciers are found.

Ans. a) A great mass of ice slowly moving down a slope, b) in Alaska, in Greenland, in Switzerland.

160. Locate the following islands: Trinidad, Queen Charlotte, Mt. Desert, Elba, Ceylon. Answer any three.

Ans. Trinidad, north of Venezuela; Queen Charlotte, west of British Columbia; Mt. Desert, south of Maine; Elba, west of Italy; Ceylon, south of Hindustan.

161. Why does the rainy season within the zones of the trade winds occur in the summer season of those zones?

Ans. Within the belt of the trade winds all the rain of the year falls during the months when the sun is not far from the zenith, when the heat is so great that ascending currents take the place of the trades. These ascending currents are condensed on reaching the cooler strata of the trade belt, and give up their moisture as rain.

162. Name a river of each of the grand divisions of the earth that flows almost due north.

Ans. North America, Mackenzie; South America, Magdalena; Europe, Rhine; Africa, Nile; Asia, Yenesei; Australia, Victoria. Other answers accepted.

163. Give the location of *each* of the following: Hindustan, Armenia, Congo river, Madagascar, Finland.

Ans. Hindustan, in southern part of Asia; Armenia, in northeastern part of Asiatic Turkey; Congo river, in southern part of Africa; Madagascar, in the Indian ocean, southeast of Africa; Finland, in northwestern part of Russia.

164. Mention an important fact connected with *each* of the following places and give the location of

each place: Valley Forge, Gibraltar, Mecca, Colorado Springs, Quebec.

Ans. Valley Forge, southeastern part of Pennsylvania; Washington's winter quarters in 1777-1778. Gibraltar, southwestern part of Spain; it is the strongest fortification in the world. Mecca, southern part of Turkey in Asia; holy city of the Mohammedans. Colorado Springs, central part of Colorado; a health resort. Quebec, southern part of province of Quebec; oldest city in Quebec; fortified city.

Commercial.

165. Mention *a*) two of the leading silk-producing countries of Asia; *b*) the leading country of Europe in the manufacture of silk goods.

Ans. *a*) China and Japan; *b*) France.

166. Name an important product of *a*) Persia; *b*) Arabia; *c*) Congo Free State; *d*) Cape Colony. Answer any three.

Ans. Persia — silk, drugs, carpets, rugs, and shawls; Arabia — horses, camels, pearls, wool, and coffee; Congo Free State — ivory, rubber, and palm oil; Cape Colony — ostriches, diamonds, sheep, and cattle.

167. Trace a probable route from New York to the Philippine islands *a*) going in an easterly direction; *b*) leaving New York in a westerly direction.

Ans. *a*) Through New York bay, Atlantic ocean, Strait of Gibraltar, Mediterranean sea, Suez canal, Red sea, Strait of Bab-el-Mandeb, Gulf of Aden, Indian ocean, Strait of Malacca, and China sea. *b*) To San Francisco by rail, across the Pacific ocean by steamship.

168. *a*) Mention three products for which Australia is noted. *b*) Of what empire is Australia apart? *c*) What large island near to and directly north of Australia?

Ans. *a*) Wool, gold, stock; *b*) British; *c*) New Guinea.

169. State five important causes of the great commercial wealth of this country.

Ans. 1) The climate and soil, which are especially adapted for a strong intellectual people; 2) its inexhaustible mineral resources; 3) its extensive forests and grazing ground; 4) its great river systems and lakes, which afford means of transportation and water power; 5) its numerous good harbors and its natural position and facilities to command trade from other countries.

170. Trace a water route from *a*) Buffalo to Chicago; *b*) Chicago to Duluth; *c*) Buffalo to Montreal; *d*) Buffalo to New York.

Ans. *a*) Lake Erie, Detroit river, Lake St. Clair, St. Clair river, Lake Huron, Strait of Mackinac, Lake Michigan; *b*) Lake Michigan, Strait of Mackinac, St. Mary's river, St. Mary's canal, White Fish bay, Lake Superior; *c*) Lake Erie, Welland canal, Lake Ontario, St. Lawrence river; *d*) Erie canal, Hudson river.

171. *a*) Which are the two most important waterways of North America? *b*) Name two important commercial cities on each.

Ans. *a*) The waterway formed by the Great Lakes, Erie canal, and Hudson river; the Mississippi system. *b*) Chicago, New York; St. Louis, New Orleans.

172. *a*) What is the direction and the approximate distance of the Hawaiian islands from San Francisco? What are their *b*) physical features, *c*) principal city, *d*) government, *e*) chief export?

Ans. *a*) Southwest, 2,000 miles; *b*) the islands are of volcanic origin, and many parts are rugged with cones and old lava flows, but there are also many fertile, well-watered valleys, having a rich soil and luxuriant vegetation; *c*) Honolulu; *d*) colonial; *e*) sugar.

173. Trace the shortest all-water route from New York to Manila.

Ans. New York harbor, Atlantic ocean, Strait of Gibraltar, Suez canal, Red sea, Strait of Bab-el-Mandeb, Gulf of Aden, Arabian sea, Indian ocean, Strait of Malacca, China sea, and Manila bay.

174. Name *a*) two great internal waterways of the United States; *b*) five important cities on each.

Ans. *a)* 1. The Mississippi river system; 2. the Great Lake system, including the Erie canal and Hudson river. *b)* On 1 are Minneapolis, St. Louis, New Orleans, Cincinnati, Pittsburg. On 2 are Chicago, Detroit, Cleveland, Buffalo, New York.

175. On what waters would you sail in journeying by ship from London to Constantinople?

Ans. Thames river, North sea, Strait of Dover, English channel, Atlantic ocean, Strait of Gibraltar, Mediterranean sea, Ægean sea, Strait of Dardanelles, Sea of Marmora, Bosphorus strait.

176. Name *a)* two important exports; *b)* two principal cities; *c)* one valuable forest product; *d)* one mineral product, of Cuba.

Ans. *a)* Sugar, tobacco; *b)* Havana, Santiago de Cuba; *c)* mahogany; *d)* copper.

177. Trace a water communication between *a)* Chicago and New York city; *b)* New York city and Baltimore.

Ans. *a)* Lake Michigan, Strait of Mackinac, Lake Huron, St. Clair river and lake, Detroit river, Lake Erie, Erie canal, Hudson river. *b)* New York bay, Atlantic ocean, Chesapeake bay.

178. Mention *three* important articles that would probably be found in the cargo of a ship sailing from *a)* New York to Montevideo, *b)* Montevideo to New York.

Ans. A cargo of goods being sent from New York to Montevideo would contain iron manufactures, breadstuffs, and grain. On returning a vessel would bring back hides, horns, and tallow.

179. Name and locate *a)* three important mineral products of the Appalachian highlands; *b)* two of the Rocky mountain highlands.

Ans. *a)* Iron and coal in Pennsylvania and West Virginia; petroleum in Pennsylvania; marble in New Hampshire. *b)* Gold, silver, copper, and lead in Colorado or Utah.

180. Mention in order the waters that would be traversed by a steamer going from Liverpool to Hong Kong. Mention *two* articles that would probably form part of her cargo.

Ans. The waters traversed by a steamer going from Liverpool to Hong Kong are as follows: Mersey river, Irish sea, St. George's channel, Atlantic ocean, Strait of Gibraltar, Mediterranean sea, Suez canal, Red sea, Strait of Bab-el-Mandeb, Gulf of Aden, Arabian sea, Indian ocean, Bay of Bengal, Strait of Malacca, South China sea, to Hong Kong. Cotton goods and machinery would probably form part of her cargo.

181. What effect is a great extent of sea coast likely to have upon *a*) the climate of a country, *b*) the occupations of the people?

Ans. The country which has a great extent of sea coast generally causes the land to be warmer in winter and cooler in summer than the land farther inland. The reason being that water gets warm more slowly than land, and breezes blowing on the land from the water will cool the land in summer, and as water cools more slowly than land, the breezes blowing from the sea will be warmer in the winter. The occupations of the people will be fishing and commerce.

182. Give an all-water route from Chicago to San Francisco. From Omaha to London.

Ans. There are no such routes possible — first, ocean steamers do not enter the Chicago harbor, and second, the Missouri river is not navigable.

183. Give a list of the products of Brazil. Of Canada. Of Cuba. Of Mexico.

Ans. Products of Brazil are rubber, dye woods, coffee, cattle and cattle products, sugar, tobacco, corn, gold, and diamonds; of Canada, lumber, fish products, oats, wheat, cattle, sheep, coal, gold, silver, and oil; of Cuba, fine woods, mahogany, ebony, etc., tobacco, copper, iron, and coffee; of Mexico, coffee, tobacco, cattle, cattle products, and silver.

184. What constitutes a fertile soil? A fertile region? Name a fertile region. One that is not fertile.

Ans. A fertile soil is a productive soil. The

constituent parts of a soil are determined by chemical analysis. Different vegetable life demands different chemical elements, hence the constituent parts of productive soils vary. A fertile region is a region which produces vegetable life which supplies man's comforts or necessities. The Mississippi valley is a fertile region, and the Sahara is not.

185. Locate Port Arthur, Gibraltar, The Hague, Vancouver, Sheffield, Hamburg, Odessa, Johannesburg, Sydney, Asuncion.

Ans. Port Arthur is in Manchuria on an arm of Yellow sea. Gibraltar is in Spain on the Strait of Gibraltar, at the opening of the Mediterranean sea. The Hague is on the west coast of the Netherlands on the North sea. Vancouver is in British Columbia on the southwest coast. Sheffield is in the north central part of England. Hamburg is in the northwest part of Germany on the Elbe river. Odessa is in southwest Russia on the Black sea. Johannesburg is in South Africa near Pretoria. Sydney is in Australia on the east coast of New South Wales. Asuncion is in Paraguay on the Parana river.

186. What natural conditions favor the growth of a commercial city; a manufacturing city? Illustrate in each case by giving two examples.

Ans. A commercial town needs an outlet by land or water, by means of which trade may pass from a rich, productive region for distribution to the markets of the world; and, in return, the world markets may supply operative machinery for the local region. Boston, Quebec, and New Orleans may serve as examples. For a town to become a manufacturing center, the surrounding country must make the feeding and housing of workmen practicable; capital must be available, nature must equip the location with a climate favorable to handling the factory's product, provide adequate water power, permit the construction of proper transportation facilities, supply sufficient materials for the factories, and an extended market for the manufactured articles. New York, Pittsburg, and St. Louis may be cited.

187. Locate the Hawaiian islands. Name three important products of the Philippine islands.

Ans. a) These islands are located not far from the center of the Pacific ocean, within the tropics, 2,100

130. Give the principal or predominant mountain system in each of the five grand divisions.

Ans. North America — Rocky; South America — Andes; Europe — Alps; Asia — Himalaya (Hindoo Kush or Armenian); Africa — Abyssinian; Australia — Australian Alps or Blue mountains.

131. Tell what rivers drain the following lakes and name the body of salt water into which each river empties : Otsego, Moosehead, Victoria Nyanza, Geneva, Winnipeg.

Ans. Susquehanna, Chesapeake bay; Kennebec, Atlantic ocean; Nile, Mediterranean sea; Rhone, Gulf of Lyons; Nelson, Hudson bay.

132. What political divisions are separated in part by *a*) the Pyrenees, *b*) the Southern Andes, *c*) the Himalayas, *d*) St. George's channel, *e*) the Savannah river?

Ans. *a*) France and Spain, *b*) Chile and Argentina, *c*) Chinese Empire and Hindostan, *d*) Ireland and Wales, *e*) South Carolina and Georgia.

133. Tell where each of the following animals is found, and state why each is valuable: Llama, chamois, whale, reindeer, ostrich.

Ans. South America, beast of burden; Europe, soft leather; North Atlantic and Pacific, whale oil and bone; Lapland, food, clothing, and beast of burden; South Africa, plumage.

134. Locate and describe *a*) the prairies, *b*) the tundra, *c*) the steppes.

Ans. *a*) Prairies are open, grassy plains. They are located in the central portion of the great central plains of the United States. *b*) The tundra is a treeless, swampy region covered with coarse moss and lichens. They are located on the Arctic coast of Russia. *c*) The steppes are great plains located in the southwestern Asiatic Russia and in southeastern European Russia.

135. Name a city in each of the following river valleys, and tell something interesting about each city named: Rhine, Danube, Nile, Chemung, Connecticut.

Ans. Cologne, noted for its cathedral; Vienna is the capital of Austria-Hungary; Cairo, the capital of Egypt, is the largest city in Africa; Elmira is the seat of Elmira College for Women; Springfield contains a United States arsenal.

136. Name in order the states and larger rivers that one would cross in going from Boston to Richmond, Va.

Ans. Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia. Rivers crossed: Connecticut, Hudson, Delaware, Potomac.

137. Name a large island or group of islands lying southeast of *a*) North America; *b*) South America; *c*) Asia; *d*) Africa; *e*) Australia.

Ans. *a*) West Indies; *b*) Falkland Islands; *c*) Borneo; *d*) Madagascar; *e*) New Zealand.

138. Mention two peninsulas that form a part of the territory of Mexico and the bodies of water that touch the shores of each.

Ans. Lower California — Gulf of California and Pacific ocean. Yucatan — Gulf of Mexico, Yucatan channel, Bay of Honduras, Bay of Campeche.

139. Locate the following cities and state for what each is noted: *a*) Edinburgh; *b*) Venice; *c*) Athens; *d*) Rio Janeiro.

Ans. *a*) Edinburgh is in the southwestern part of Scotland, and is noted for its literary institutions. *b*) Venice is in the northeastern part of Italy on the Adriatic sea, and is built entirely on islands. *c*) Athens is in the eastern part of Greece, and is remarkable for its ruins, works of art, and historical associations. *d*) Rio Janeiro is in the northeastern part of Brazil. It has one of the best harbors in the world and is the largest coffee market in the world.

140. Name an important city *a*) in the Danube basin; *b*) on the Seine; *c*) on the Elbe; *d*) on the Ganges; *e*) on the Black sea.

Ans. *a*) Vienna; *b*) Paris; *c*) Hamburg or Dresden; *d*) Calcutta; *e*) Odessa.

141. In what country and on or near what water is each of the following cities: *a)* Vienna; *b)* Athens; *c)* Madras; *d)* Montevideo?

Ans. *a)* Austria, on the Danube. *b)* Greece, Ægean sea. *c)* India, Bay of Bengal. *d)* Uruguay, mouth of Rio de la Plata.

142. Locate the following and state for what each is noted: *a)* Mt. Etna; *b)* the Sea of Galilee; *c)* Richmond.

Ans. *a)* Active volcano, Sicily. *b)* Palestine, Asiatic Turkey, noted in Bible history. *c)* Eastern Virginia, capital Southern Confederacy.

143. *a)* Name a German city noted for its cathedral. *b)* Name the countries of Europe bordering on the Mediterranean sea.

Ans. *a)* Cologne. *b)* Spain, France, Italy, Austria, Hungary, Turkey, Greece.

144. Give the name and location of *five* noted volcanoes. Name *one* noted eruption of recent occurrence.

Ans. Mount Vesuvius, in the western part of Italy, near Naples. Mt. Etna, in Sicily. Mt. Pelee, on the Island of Martinique, one of the Lesser Antilles. Chimborazo, in the eastern part of Ecuador. Cotopaxi, in the eastern part of Ecuador. Mt. Pelee is noted for a recent eruption that destroyed the town of St. Pierre.

145. Describe *three* of the following: Columbia river, Puget Sound, Pike's Peak.

Ans. Columbia river rises in the Rocky mountains of British Columbia, flows through western and central Washington to the southern boundary, thence flows westward into Pacific ocean, forming the boundary line between Washington and Oregon. Puget Sound indents the northwestern coast of Washington. Pike's Peak is in central Colorado, near Cripple Creek gold mines and Colorado Springs.

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148. Give *three* examples of mountain ranges parallel to coast lines and one not so situated. What reason is given for this general parallel position?

Ans. Sierra Nevada, Coast Range, Appalachian, Andes, Ural, Pyrenees, Carpathians. (Other examples may be given.)

Most mountains are supposed to have been formed by the strain produced by the slow cooling of the interior of the earth. The lateral pressure exerted from the ocean bedside acted at an angle to the direction of the forces exerted by the continental areas, and consequently the folding was along axes parallel to the coast lines.

149 Compare North America with South America, noting similar features of form, elevation, and drainage.

Ans. North America and South America are similar in that each have *a*) a general triangular form with the apex to the south, *b*) a general trend to the northwest to the predominant mountain system in the west, the secondary mountain system in the east, and the great low plain between the two systems, *d*) their drainage to a great extent performed by rivers that flow into the Atlantic ocean or its tributaries.

150. Define promontory, isthmus, peninsula, delta, divide. Give an example of each, stating its name and location.

Ans. A *promontory* is a high, rocky cape. Cape Horn, at southern extremity of South America. An *isthmus* is a neck of land connecting two larger bodies of land. The Isthmus of Panama connects North and South America and separates the Carribean sea from the Pacific ocean. A *peninsula* is a body of land nearly surrounded by water. Florida is a peninsula. It projects from the southeastern part of the United States, and is nearly surrounded by the Atlantic ocean, Florida strait, and the Gulf of Mexico. A *delta* is formed by sediment deposited in a river mouth. The Mississippi has a delta. A *divide* is a range of hills or mountains separating one river basin from another. The Height of Land in the northern part of the United States is a divide.

151. Describe *two* of the following: Bering strait, Columbia river, Strait of Mackinac, Puerto Rico, Delagoa bay.

Ans. Bering strait separates Asia from North America, and connects Bering sea and the Arctic ocean. Columbia river rises in the Bitter Root mountains in British Columbia, and flows southwest into the Pacific ocean.

152. Describe *two* of the following: Shannon river, Giant's causeway, Cheviot hills, The Wash, Strait of Dover.

Ans. The Cheviot hills are on the boundary between Scotland and England, and extend generally northeast and southwest. The Strait of Dover separates England from the mainland of Europe, and connects the North sea and English channel.

153. Mention *two* bodies of water and *three* political divisions of land in the eastern hemisphere that are crossed by the tropic of Cancer.

Ans. Red sea and Arabian sea. Egypt, Arabia, India.

154. What is *each* of the following and where is it located: a) Dardanelles, b) Kimberley, c) Khartum, d) St. Elias, e) Vladivostok?

Ans. *a)* A strait separating Turkey in Europe from Turkey in Asia. *b)* A city in South Africa. *c)* A city in northeastern Africa on the Nile river. *d)* A mountain peak in Alaska. *e)* A city in southeastern Siberia.

155. Explain why there are no large rivers of the United States flowing into the Great Lakes.

Ans. Because the land south of the Great Lakes slopes toward the Gulf of Mexico and the Mississippi river. Therefore there is a large river south of the Great Lakes that flows south instead of north.

156. Write briefly on the Panama canal, touching on the location and climate of the country, the length of the canal, and its advantages to the United States and to Europe.

Ans. The Panama canal will extend across the Isthmus of Panama, a distance of fifty-four miles. The climate of this part of the country is very warm. The canal will be an advantage to the United States because it will stimulate trade with the western coast of South America and give a much shorter water route between the Atlantic seaboard and the Pacific coast for commerce and for protection in time of war.

The canal will give Europe a shorter water route for commercial intercourse with most countries bordering on the Pacific ocean.

157. Name and give the location of *a)* six large seaport cities on the Atlantic coast of North America; *b)* three on the gulf coast; *c)* three on the Pacific.

Ans. *a)* Halifax, in Nova Scotia, on Atlantic coast; Boston, in Massachusetts, on Massachusetts bay; New York, in the State of New York, on New York bay; Baltimore, in Maryland, on Chesapeake bay; Charleston, in South Carolina, on the coast; Savannah, in Georgia, at the mouth of the Savannah river. *b)* Mobile, in Alabama, on Mobile bay; Galveston, in Texas, on Galveston bay; Vera Cruz, in eastern part of Mexico. *c)* Acapulco, in southwestern part of Mexico; San Francisco, in California, on San Francisco bay; Tacoma, in Washington, on Puget sound.

158. Give the location of the volcanic belt in *a)* the eastern continent; *b)* the western.

Ans. a) In Kamchatka and the islands of Kurile, Japan, Formosa, Philippine, Molucca, Australia, New Guinea, New Britain, New Hebrides and New Zealand, and southern Europe. b) In the region of the Andes, Sierra Nevada, and Cascade mountains, Central America, Mexico, Alaska, and the Aleutian islands.

159. a) What is a glacier? b) Give the location of three regions where glaciers are found.

Ans. a) A great mass of ice slowly moving down a slope, b) in Alaska, in Greenland, in Switzerland.

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Ans. Trinidad, north of Venezuela; Queen Charlotte, west of British Columbia; Mt. Desert, south of Maine; Elba, west of Italy; Ceylon, south of Hindustan.

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164. Mention an important fact connected with *each* of the following places and give the location of

each place: Valley Forge, Gibraltar, Mecca, Colorado Springs, Quebec.

Ans. Valley Forge, southeastern part of Pennsylvania; Washington's winter quarters in 1777-1778. Gibraltar, southwestern part of Spain; it is the strongest fortification in the world. Mecca, southern part of Turkey in Asia; holy city of the Mohammedans. Colorado Springs, central part of Colorado; a health resort. Quebec, southern part of province of Quebec; oldest city in Quebec; fortified city.

Commercial.

165. Mention *a*) two of the leading silk-producing countries of Asia; *b*) the leading country of Europe in the manufacture of silk goods.

Ans. *a*) China and Japan; *b*) France.

166. Name an important product of *a*) Persia; *b*) Arabia; *c*) Congo Free State; *d*) Cape Colony. Answer any three.

Ans. Persia — silk, drugs, carpets, rugs, and shawls; Arabia — horses, camels, pearls, wool, and coffee; Congo Free State — ivory, rubber, and palm oil; Cape Colony — ostriches, diamonds, sheep, and cattle.

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Ans. *a*) Lake Erie, Detroit river, Lake St. Clair, St. Clair river, Lake Huron, Strait of Mackinac, Lake Michigan; *b*) Lake Michigan, Strait of Mackinac, St. Mary's river, St. Mary's canal, White Fish bay, Lake Superior; *c*) Lake Erie, Welland canal, Lake Ontario, St. Lawrence river; *d*) Erie canal, Hudson river.

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Ans. *a*) The waterway formed by the Great Lakes, Erie canal, and Hudson river; the Mississippi system. *b*) Chicago, New York; St. Louis, New Orleans.

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173. Trace the shortest all-water route from New York to Manila.

Ans. New York harbor, Atlantic ocean, Strait of Gibraltar, Suez canal, Red sea, Strait of Bab-el-Mandeb, Gulf of Aden, Arabian sea, Indian ocean, Strait of Malacca, China sea, and Manila bay.

174. Name *a*) two great internal waterways of the United States; *b*) five important cities on each.

Ans. a) 1. The Mississippi river system; 2. the Great Lake system, including the Erie canal and Hudson river. b) On 1 are Minneapolis, St. Louis, New Orleans, Cincinnati, Pittsburg. On 2 are Chicago, Detroit, Cleveland, Buffalo, New York.

175. On what waters would you sail in journeying by ship from London to Constantinople?

Ans. Thames river, North sea, Strait of Dover, English channel, Atlantic ocean, Strait of Gibraltar, Mediterranean sea, Ægean sea, Strait of Dardanelles, Sea of Marmora, Bosphorus strait.

176. Name a) two important exports; b) two principal cities; c) one valuable forest product; d) one mineral product, of Cuba.

Ans. a) Sugar, tobacco; b) Havana, Santiago de Cuba; c) mahogany; d) copper.

177. Trace a water communication between a) Chicago and New York city; b) New York city and Baltimore.

Ans. a) Lake Michigan, Strait of Mackinac, Lake Huron, St. Clair river and lake, Detroit river, Lake Erie, Erie canal, Hudson river. b) New York bay, Atlantic ocean, Chesapeake bay.

178. Mention *three* important articles that would probably be found in the cargo of a ship sailing from a) New York to Montevideo, b) Montevideo to New York.

Ans. A cargo of goods being sent from New York to Montevideo would contain iron manufactures, bread-stuffs, and grain. On returning a vessel would bring back hides, horns, and tallow.

179. Name and locate a) three important mineral products of the Appalachian highlands; b) two of the Rocky mountain highlands.

Ans. a) Iron and coal in Pennsylvania and West Virginia; petroleum in Pennsylvania; marble in New Hampshire. b) Gold, silver, copper, and lead in Colorado or Utah.

180. Mention in order the waters that would be traversed by a steamer going from Liverpool to Hong Kong. Mention *two* articles that would probably form part of her cargo.

Ans. The waters traversed by a steamer going from Liverpool to Hong Kong are as follows: Mersey river, Irish sea, St. George's channel, Atlantic ocean, Strait of Gibraltar, Mediterranean sea, Suez canal, Red sea, Strait of Bab-el-Mandeb, Gulf of Aden, Arabian sea, Indian ocean, Bay of Bengal, Strait of Malacca, South China sea, to Hong Kong. Cotton goods and machinery would probably form part of her cargo.

181. What effect is a great extent of sea coast likely to have upon *a*) the climate of a country, *b*) the occupations of the people?

Ans. The country which has a great extent of sea coast generally causes the land to be warmer in winter and cooler in summer than the land farther inland. The reason being that water gets warm more slowly than land, and breezes blowing on the land from the water will cool the land in summer, and as water cools more slowly than land, the breezes blowing from the sea will be warmer in the winter. The occupations of the people will be fishing and commerce.

182. Give an all-water route from Chicago to San Francisco. From Omaha to London.

Ans. There are no such routes possible — first, ocean steamers do not enter the Chicago harbor, and second, the Missouri river is not navigable.

183. Give a list of the products of Brazil. Of Canada. Of Cuba. Of Mexico.

Ans. Products of Brazil are rubber, dye woods, coffee, cattle and cattle products, sugar, tobacco, corn, gold, and diamonds; of Canada, lumber, fish products, oats, wheat, cattle, sheep, coal, gold, silver, and oil; of Cuba, fine woods, mahogany, ebony, etc., tobacco, copper, iron, and coffee; of Mexico, coffee, tobacco, cattle, cattle products, and silver.

184. What constitutes a fertile soil? A fertile region? Name a fertile region. One that is not fertile.

Ans. A fertile soil is a productive soil. The

constituent parts of a soil are determined by chemical analysis. Different vegetable life demands different chemical elements, hence the constituent parts of productive soils vary. A fertile region is a region which produces vegetable life which supplies man's comforts or necessities. The Mississippi valley is a fertile region, and the Sahara is not.

185. Locate Port Arthur, Gibraltar, The Hague, Vancouver, Sheffield, Hamburg, Odessa, Johannesburg, Sydney, Asuncion.

Ans. Port Arthur is in Manchuria on an arm of Yellow sea. Gibraltar is in Spain on the Strait of Gibraltar, at the opening of the Mediterranean sea. The Hague is on the west coast of the Netherlands on the North sea. Vancouver is in British Columbia on the southwest coast. Sheffield is in the north central part of England. Hamburg is in the northwest part of Germany on the Elbe river. Odessa is in southwest Russia on the Black sea. Johannesburg is in South Africa near Pretoria. Sydney is in Australia on the east coast of New South Wales. Asuncion is in Paraguay on the Parana river.

186. What natural conditions favor the growth of a commercial city; a manufacturing city? Illustrate in each case by giving two examples.

Ans. A commercial town needs an outlet by land or water, by means of which trade may pass from a rich, productive region for distribution to the markets of the world; and, in return, the world markets may supply operative machinery for the local region. Boston, Quebec, and New Orleans may serve as examples. For a town to become a manufacturing center, the surrounding country must make the feeding and housing of workmen practicable; capital must be available, nature must equip the location with a climate favorable to handling the factory's product, provide adequate water power, permit the construction of proper transportation facilities, supply sufficient materials for the factories, and an extended market for the manufactured articles. New York, Pittsburg, and St. Louis may be cited.

187. Locate the Hawaiian islands. Name three important products of the Philippine islands.

Ans. a) These islands are located not far from the center of the Pacific ocean, within the tropics, 2,100

miles southwest from San Francisco. b) The forests of the Philippine islands yield woods, fruits, and medicinal plants. Rice, sugar cane, manila hemp, coffee, and tobacco come from the plains. Iron and copper are abundant, while lead, coal, sulphur, and gold are found.

188. Name the regions from which the world's supply of the following commodities is obtained: Coffee, quinine, copper, tin, cork, wool, tobacco, hemp, mercury, and petroleum.

Ans. *Coffee* — Brazil, Venezuela, Central America, Mexico, East Indies, and Arabia.

Quinine — Peru, Ecuador, Java and East Indies, and India.

Copper — United States, Spain, Portugal, Chile, Germany, Australasia, Mexico, South Africa.

Tin — Straits Settlements, Banca, Bolivia, Great Britain, Tasmania.

Cork — Spain, Portugal, Algeria, Morocco.

Wool — Australia, Argentina, Russia, United States, Great Britain, France, Spain, South Africa, Uruguay, India, Austria, Germany.

Tobacco — United States, India, Russia, Austria, Java, Japan, Turkey, Brazil, Germany.

Hemp — Russia, France, Germany, Austria, United States, Philippine islands.

Mercury — Spain, United States, Austria, Mexico, Russia.

Petroleum — United States, Russia, Austria, Sumatra, Java, Canada.

189. A vessel sails from New York bound for Manila. Name the three routes it might take.

Ans. a) Via Suez canal; b) via Good Hope; c) via Cape Horn.

190. Give the name and location of a city or a section of country where *each* of the following is extensively produced: 1) Shoes, 2) wood pulp, 3) watches, 4) linen goods, 5) canned salmon.

Ans. 1) Lynn, eastern part of Massachusetts; 2) the counties on the southeastern border of the Adirondacks; 3) Geneva, Switzerland; 4) Belfast, in north-eastern Ireland; 5) along the Columbia river in Washington and Oregon.

191. Name a) six minerals found in the United States; b) a leading state in the production of each.

Ans. a-b) Coal, from Pennsylvania, West Virginia, Ohio; iron, from Pennsylvania, New York, Ohio; lead, from Colorado, Utah, Wisconsin; copper, from Montana, Michigan, Arizona; gold, from California, Nevada, Colorado; silver, from Colorado, Montana, Nevada.

192. Name *a)* five seaports on the Atlantic coast of the United States; *b)* the state in which each is located.

Ans. a-b) Boston, Massachusetts; New York, New York; Baltimore, Maryland; Charleston, South Carolina; Savannah, Georgia.

193. What would be the probable cargo of a vessel loading at *a)* St. Johns, Newfoundland; *b)* Havana; *c)* Para; *d)* Calcutta?

Ans. a) Codfish; *b)* tobacco; *c)* cocoa, Brazil nuts; *d)* cotton.

194. Show how the building of railroads promotes the civilization of a people.

Ans. Enables them to exchange their products, manufactures, and ideas quickly and cheaply, and keeps them in constant communication by mails, by express, by freight, and by traveling.

195. Locate *a)* the greatest wool-producing region in the world; *b)* the leading country in the manufacture of woollen goods.

Ans. a) Australia; *b)* England.

196. Discuss the new canal being built by the United States government as to *a)* location; *b)* nature—lock or sea-level; *c)* probable cost; *d)* distance saved in shipping.

Ans. The Isthmian canal across the Isthmus of Panama will connect the Atlantic ocean with the Pacific. It reaches from Colon to the city of Panama. The nature of the canal is drawing an unusual amount of discussion from engineers, both on account of the magnitude of the undertaking and the engineering and sanitary problems encountered. The plans at present pursued call for a lock canal; but as work advances they will probably be changed so as to provide for a canal of the sea-level type. The total cost of completing

the Panama canal is estimated at \$144,233,358; but at the present rate of expenditure this sum will have been expended long before the canal is completed. The extra cost comes largely from the work of sanitation. The United States has paid the French company \$40,000,000 for their rights and the canal, the Panama government \$10,000,000, together with an annual rental of \$250,000 to begin ten years after the ratification of the treaty. Although it is impossible here to give the miles and hours saved on a voyage in each ocean route, yet it is estimated that a vessel can make a transit of the canal in eleven hours and fourteen minutes, from which our readers may draw conclusions as to time saved.

197. Name *a)* two important seaports on the Atlantic coast of South America; *b)* one on the Pacific coast.

Ans. *a)* Rio Janeiro, Buenos Ayres; *b)* Valparaíso.

198. *a)* Give three of the chief productions of the Philippine islands. *b)* What is the largest of the islands? *c)* The chief city?

Ans. *a)* Hemp, rice, maize, sugar, indigo, tobacco, coffee; *b)* Luzon; *c)* Manila.

199. *a)* What is the capital of the Dutch East Indies? *b)* What mineral is largely produced in these islands? *c)* Name the largest of these islands.

Ans. *a)* Batavia; *b)* gold, tin, iron, copper are abundant; *c)* Borneo.

200. Name *two* widely separated regions of the western hemisphere that produce hides extensively. Which one of the United States is the most noted for turning hides into shoes?

Ans. Argentina and Mexico. Massachusetts.

201. What flag flies over *a)* Honolulu, *b)* Hong Kong, *c)* Algiers, *d)* Batavia, *e)* Sydney. Mention an important export of each of these cities.

Ans. *a)* American; sugar, rice. *b)* British; tea, silk, opium. *c)* French; palm oil, dates, olives. *d)* The Netherlands; pepper, spices. *e)* British; wool, hides, gold.

202. What articles are generally shipped *a)* from our Pacific coast to Japan, *b)* from Japan in return?

Ans. *a)* Locomotives, cotton, flour, machinery; *b)* tea, silk, porcelain, lacquered ware.

203. State three countries from which coffee is imported into the United States, and two from which sugar is imported.

Ans. *a)* Java, Arabia, Brazil; *b)* Cuba, Hawaii.

204. What great commercial city at or near the delta of *a)* the Ganges; *b)* the Nile; *c)* the Mississippi?

Ans. *a)* Calcutta; *b)* Alexandria or Cairo; *c)* New Orleans.

205. For what product is each of the following islands noted: *a)* Ceylon; *b)* Java; *c)* Mauritius?

Ans. *a)* Tea; *b)* coffee; *c)* sugar.

206. *a)* What is the leading product of the Philippine islands? *b)* Name four other important products.

Ans. *a)* Tobacco, hemp, sugar, or rice. *b)* Coffee, bananas, oranges, pineapples, spice, indigo, maize, cotton.

207. Mention an important export of *a)* the Bermuda islands; *b)* Trinidad; *c)* Jamaica.

Ans. *a)* Garden vegetables. *b)* Asphalt. *c)* Rum.

208. Describe the production of each of *three* of the following: Honey, cocoanuts, cork, olive oil, dates.

Ans. Honey is made by bees. They first gather the sweet juice from the sugar-maple tree or the pollen from flowers and carry it to the hive. The wax also has to be found. There are bees in the hive and they fill themselves with the honey and after a while put it in the little cups or combs of wax. Cork is the bark of the cork tree. It is stripped from the tree once in seven years. Dates are the fruit of the date palm. They are grown in Ceylon and other tropical regions.

209. From what country does the United States make large importations of *a)* silk, *b)* rubber, *c)* linen, *d)* coffee, *e)* tea, *f)* wool, *g)* hides, *h)* wine, *i)* crockery, *j)* sugar?

Ans. a) France, Italy, China. b) Brazil. c) Ireland, Belgium, d) Brazil, Java. e) China, Japan, Ceylon. f) Argentina. g) Argentina. h) France. i) England. j) Cuba, Hawaii. (Other countries may be given.)

210. By what artificial channel are the waters of the great oceans united in the eastern hemisphere and by whom is the passage controlled? By what prospective channel are the great oceans to be united in the western hemisphere and by whom will the passage be controlled?

Ans. The Suez canal, controlled by England. The Panama canal, controlled by the United States.

211. Name in order *eight* cities that a vessel might visit in a trip from Duluth to Quebec.

Ans. Superior, Port Huron, Detroit, Toledo, Sandusky, Cleveland, Erie, Dunkirk, Buffalo, Hamilton, Toronto, Oswego, Ogdensburg, Montreal.

212. Give the name and the location of a city noted for the manufacture of a) flour, b) shoes, c) gloves, d) collars and cuffs, e) iron and steel.

Ans. a) Minneapolis is in the southeastern part of Minnesota on the Mississippi river. b) Lynn is in the eastern part of Massachusetts on Massachusetts bay. c) Gloversville is in the east central part of New York State. d) Cohoes is in the eastern part of New York State on the Mohawk river. e) Pittsburg is in the western part of Pennsylvania at the junction of the Allegheny and Monongahela rivers.

213. State approximately by how much the all-water route from New York to San Francisco will be shortened by the Panama canal. What similar waterway crosses the narrow strip of land connecting Eurasia and Africa?

Ans. a) 8,000 to 12,000 miles. b) Suez canal.

214. Mention *three* important products of the Philippine islands and *two* important products of the Hawaiian group.

Ans. a) Hemp, raw sugar, tobacco. b) Raw sugar, rice.

215. Mention *three* leading exports from the United States to Mexico; *three* leading imports into the United States from Mexico.

Ans. Exports to Mexico: manufactured goods, bread-stuffs, meats. Imports from Mexico: minerals, sisal hemp, vanilla.

216 Give the name of a country that is a leading source of supply for the United States of *each* of the following: coffee, mahogany lumber, bananas, silks, hemp.

Ans. Coffee, Brazil; mahogany lumber, Honduras; bananas, Cuba; silks, France; hemp, Philippine Islands.

217. a) In what zone are the Hawaiian Islands? Name b) the largest of these islands; c) the chief city; d) the important product.

Ans. a) Torrid zone, b) Hawaii, c) Honolulu, d) sugar.

218. State *five* substances that are extensively used as fuel and mention a locality where each is produced.

Ans. Coal, found in Pennsylvania; wood, found in Michigan; peat, found in Ireland; oil, found in Pennsylvania; gas, found in Allegany county, N. Y.

North America.

219. Mention *five* provinces included in the Dominion of Canada. Compare the government of Canada with that of the United States.

Ans. Quebec, Ontario, British Columbia, New Brunswick and Manitoba are provinces included in the Dominion of Canada. Canada is under the control of Great Britain. It is ruled by a governor-general. Each province is ruled by a lieutenant-governor, who is elected or appointed by the governor-general. The governor-general is appointed by the sovereign of Great Britain. The law-making body is called Parliament; it is composed of two houses. The United States is a republic, its laws are made by Congress. The President is elected by the people. The laws are made by Congress, which is composed of two houses, the Senate and House of Representatives. The President is elected for four years.

220. Why has Mexico so great a variety of vegetable products? Mention *two* things a traveler would be likely to notice about the Mexican people.

Ans. Mexico has a great variety of vegetable products because it has a great variety of climate. The coast is low and hot. Here grow torrid plants, the interior is a high plateau, which is mild. Here grow temperate plants. Two things a traveler would be likely to notice about the Mexican people are their love for gay colors and their language which is Spanish.

221. Name five rivers of the Atlantic slope of the United States.

Ans. Penobscot, Merrimac, Hudson, Delaware, James.

222. Name *a*) four Canadian provinces bordering upon the United States; *b*) an important city in each of the provinces named.

Ans. *a* and *b*) 1. New Brunswick — St. John, Fredericton; 2. Quebec — Quebec, Montreal; 3. Ontario — Ottawa, Toronto; 4. Manitoba — Winnipeg; 5. Assiniboia — Regina; 6. British Columbia — Victoria.

223. Describe a winter voyage from New York to Panama, telling on what waters and past what islands one would sail and mentioning the differences in climate and vegetation that would be apparent.

Ans. New York bay, The Narrows, Atlantic ocean, Windward passage, Caribbean sea. Islands passed: Staten, Long, Bahama, Cuba, Haiti, Jamaica. The ground is probably frozen and covered with snow at New York, but soon after leaving that city and, especially, when you enter the gulf stream and temperature rises and spring-like weather prevails. The temperature continues to rise until you arrive at Panama where it is hot and the semi-tropical vegetation of the West Indies changes to the tropical vegetation of Panama.

224. Locate in British America *a*) the great highland regions; *b*) the great lowland regions; *c*) two great waterways, or watercourses.

Ans. *a*) Western part; *b*) eastern central; *c*) Mackenzie flows north draining the western part; St. Lawrence flows east draining the southern part.

- 225.** a) Compare with respect to climate the Pacific coast of Alaska with the Atlantic coast of Labrador.
b) Give reasons for conditions noted.

Ans. Alaska is much warmer owing to the warm ocean current.

- 226.** Name the provinces constituting the Dominion of Canada.

Ans. Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Manitoba, British Columbia.

- 227.** Compare the climate of southern Alaska with that of Labrador. Give reasons for the answer.

Ans. The climate of southern Alaska is modified by the Japan current, rendering it much milder than Labrador, though farther north.

- 228.** Mention *five* important rivers of British America and describe *one* of them.

Ans. The Mackenzie, the Nelson, the St. Charles, the Ottawa, and the Yukon rivers. The Mackenzie river rises in Slave lake, in the north-central part of Canada, and flows north into the Arctic ocean. In winter this river is frozen over, and when the sun comes north the ice is melted in the southern part. The water flowing north, strikes the ice and overflows many miles of land. This region is seldom visited by any one except hunters and trappers.

- 229.** Give the location of *each* of the following and state *one* important fact regarding each: Denver, Santiago, Santa Fé, Quebec, Lake Nicaragua.

Ans. Denver is in the north-central part of Colorado, and it is the capital of Colorado. Santiago is in the southeastern part of Cuba, situated on the coast. It is the second largest city in Cuba. Santa Fé is in the north-central part of New Mexico. It is the capital. Quebec is in the southern part of Quebec, on the St. Lawrence river. It is the capital of Quebec. Lake Nicaragua is in the southern part of Central America, in the State of Nicaragua. It was chosen as a part of the proposed Nicaragua canal.

- 230.** Mention in order the States bordering on British America.

Ans. The States that border on British America are Washington, Idaho, Montana, North Dakota, Minnesota, Michigan, New York, Vermont, New Hampshire, and Maine.

231. Name four important products of Cuba.

Ans. Any four of the following: Sugar, tobacco, coffee, tropical fruits, molasses, spices, mahogany and other valuable woods, indigo.

232. Mention four great lakes lying wholly within British America.

Ans. Winnipeg, Athabasca, Great Slave, Great Bear, Manitoba, Reindeer.

233. Mention *a*) a Canadian province bordering upon the Pacific ocean; *b*) its capital city; *c*) a large island forming part of its territory.

Ans. *a*) British Columbia; *b*) Victoria; *c*) Vancouver Island.

234. Name four large islands of the West Indies and state the form of government in each.

Ans. Cuba, a republic. Hayti, a republic. Porto Rico, colonial — belongs to the United States. Jamaica, colonial — belongs to Great Britain.

235. Give the name and location in Central America of *a*) three republics; *b*) one important city; *c*) one lake.

Ans. *a*) Guatemala, in the northwestern part; Honduras, in the central part; Nicaragua, in the south-central part. *b*) San José, in the southern part in Costa Rica. *c*) Nicaragua, in the southwestern part of Nicaragua.

236. *a*) Name in order of size the four islands of the Greater Antilles. *b*) What is the government of each?

Ans. Cuba, independent republic; Hayti, two independent republics; Jamaica, English colony; Porto Rico, dependency of the United States.

237. Mention *two* important lakes and *three* important rivers in British America.

Ans. Winnipeg and Great Slave lakes. Mackenzie, Nelson, and St. Lawrence rivers.

238. Name and locate four principal cities of Canada.

Ans. Montreal, in Province of Quebec, on St. Lawrence river; Toronto, in Province of Ontario, on Lake Ontario; Ottawa, in Province of Ontario, on Ottawa river; Quebec, in Province of Quebec, on St. Lawrence river.

239. Compare British America and the United States with respect to a) area; b) population.

Ans. a) They are nearly equal in area. Authorities differ in giving the exact areas. Rand & McNally give United States 3,692,125 square miles; British America, 3,653,946 square miles. b) According to the last census (1900) the population of the United States was 76,303,387; of British America about 5,400,000; the population of the United States is therefore more than fourteen times that of British America.

United States.

240. Name five cities of over 100,000 inhabitants through which one would pass in traveling from Denver to New York via Rock Island, Lake Shore, and New York Central railroads, direct route.

Ans. Any five of the following: Kansas City, Missouri, or Omaha, Chicago, Toledo, Cleveland, Buffalo, Rochester, Syracuse.

241. Name and locate four great river systems which drain the greater part of the United States.

Ans. The Mississippi system drains nearly all that portion of the United States which lies between the Appalachian and the Rocky mountains, and extends from the Height of Land to the Gulf of Mexico. The St. Lawrence system drains the basin of the Great Lakes and the southeastern part of the Dominion of Canada. The Columbia drains the northern portion of the Pacific slope. The Colorado drains the southern portion of the Pacific slope.

242. Make a sketch map of the region of the Great Lakes, and indicate by name the lakes, the connecting

watercourses, and the location of five great commercial cities.

Ans. (For model map of the Great Lakes, with connecting watercourses, and location of five great commercial cities, see any standard geography.) The lakes are Superior, Michigan, Huron, Erie, and Ontario; the connecting watercourses, St. Mary's strait, Mackinac strait, St. Clair river, St. Clair lake, Detroit river, Niagara river; the five great commercial cities, Milwaukee, Chicago, Detroit, Cleveland, Buffalo.

243. What waters border on the peninsula of *a*) Florida, *b*) Lower California, *c*) Alaska?

Ans. *a*) Atlantic ocean, Florida strait, and Gulf of Mexico; *b*) Pacific ocean and Gulf of California; *c*) Arctic ocean, Bering strait, Bering sea, and Pacific ocean.

244. *a*) Give the location of the Philippine islands. *b*) Name the largest two islands. *c*) Name two of the principal cities.

Ans. *a*) The Philippine islands are southeast of China and are the most northerly group of the East Indian archipelago. *b*) Luzon and Mindanao. *c*) Manila and Iloilo.

245. What is the largest city in the United States? What is its approximate population? What is the second largest city and its approximate population? What is the approximate population of Indianapolis?

Ans. New York, in 1900, 3,500,000; Chicago, 1,700,000; Indianapolis, 170,000.

246. Why was the Atlantic coast easier for settlement than the Pacific coast?

Ans. Nearness to the old world, frequent good harbors, good land along coast, and seagoing habits of Europeans gave the east coast great advantage over west coast of America in settlement.

247. What bay or sound is located on the coast of *a*) Rhode Island; *b*) Virginia; *c*) North Carolina; *d*) Alabama?

Ans. *a*) Narragansett bay; *b*) Chesapeake bay; *c*) Pamlico sound; *d*) Mobile bay.

248. Mention three of the five leading agricultural products of the United States.

Ans. Corn, wheat, hay, oats, cotton, butter. (Any three of these six products may be given.)

249. Designate a section of the United States which is mainly *a)* a manufacturing section; *b)* a mining section; *c)* a grain-growing section; *d)* a grazing section.

Ans. *a)* The northeastern section. *b)* The western or highland States. *c)* The north-central States. *d)* States of the plains east of the Rocky mountains.

250. *a)* What two rivers unite to form the Ohio? *b)* What city is at the place of union? *c)* For what is this city noted?

Ans. *a)* Allegheny and Monongahela. *b)* Pittsburg. *c)* Iron manufacture.

251. Make a sketch map of California indicating *a)* coast line, *b)* principal rivers; locate its *c)* capital, *d)* chief seaport.

Ans. See map.

252. Mention five rivers on the boundary between the United States and British America, and state the direction in which each flows.

Ans. Rainy Lake river, southeast; Pigeon river, southeast; Detroit river, south; Niagara river, northeast; St. Lawrence river, northeast.

253. Give the location of *each* of the following and mention *one* important fact concerning each: Mount Washington, the Golden Gate, Baton Rouge, Santa Fé, Vicksburg.

Ans. Mount Washington: Northern part of New Hampshire in the White mountains; highest peak of the White mountains. Golden Gate: In western part of California; connects San Francisco bay and Pacific ocean, and is very beautiful when the sun sets. Baton Rouge: In southeastern part of Louisiana on Mississippi river; capital of Louisiana. Santa Fé: Northern part of New Mexico; capital of New Mexico. Vicksburg: In western part of Mississippi on Mississippi river; battle fought there in Civil War.

254. Describe a railway route between Boston and Chicago. Mention all the States crossed by this route.

Ans. Boston and Albany through Massachusetts; New York Central through New York State to Buffalo; Lake Shore and Michigan Southern through Pennsylvania, Ohio, Indiana and Illinois.

255. Give the location of the following cities and state something for which each is noted: *a)* New Orleans, *b)* Cincinnati, *c)* Chicago, *d)* Duluth, *e)* Annapolis.

Ans. *a)* New Orleans is in the southeastern part of Louisiana, on the Mississippi river. It is the most important cotton and sugar port in the United States. *b)* Cincinnati is in the extreme southwestern part of Ohio on the Ohio river. It is the largest and most important city of the Ohio valley. It has an extensive trade and manufactures. *c)* Chicago is in the northeastern part of Illinois on Lake Michigan. It is the second city in size of the United States and the greatest lake port. It is the greatest railroad, food, and grain center in the world. *d)* Duluth is in the northeastern part of Minnesota on the western point of Lake Superior. It is at the head of the navigation of the Great Lakes, at the eastern terminus of the Northern Pacific railway, and is known for export of grain. *e)* Annapolis is in the central part of Maryland on the western shore of Chesapeake bay. It is the capital of the State and the seat of the United States Naval Academy.

256. Name and locate *a)* the largest city of Mexico; *b)* the largest city of South America; *c)* the largest four cities of the United States; *d)* the largest two cities of the world.

Ans. *a)* City of Mexico, situated in the south-central part, inland; *b)* Buenos Ayres, in the eastern part of the Argentine Republic, on the Rio de la Plata; *c)* city of New York, situated in the southeastern part of the State of New York, on Hudson river, East river, and New York bay; Chicago, in the northeastern part of Illinois, on Lake Michigan; Philadelphia, in the southeastern part of Pennsylvania, on Delaware river; St. Louis, in the eastern part of Missouri, on the Mississippi river; *d)* London, in the southeastern part of England, on the Thames; city of New York, in the southeastern part of New York, at the mouth of the Hudson.

257. In laying a cable from San Francisco to Manila, *a)* what islands belonging to the United States would naturally be way stations? *b)* About how long would this cable be?

Ans. *a)* Hawaiian islands and Guam. *b)* About 6,500 miles.

258. Mention in order the States that would be seen in sailing along the coast from the Bay of Fundy to the mouth of the Mississippi river.

Ans. The States which a vessel would pass in going from the Bay of Fundy to the mouth of the Mississippi river are: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi.

259. Compare the climate of Florida with that of Montana and state *three* reasons for the difference.

Ans. Florida is much warmer than Montana on account of *a)* Florida being nearer to the equator than Montana; *b)* because Florida is a low, swampy plain and Montana is mountainous. *c)* The gulf stream flows out of the Gulf of Mexico near Florida and warms the winds which sweep over it, while Montana has no warm winds sweeping over it.

260. Of what advantage is it to the United States to have "all varieties of soil, climate, and products, both vegetable and mineral?"

Ans. The United States produces all she really needs for her own support. Her people are independent of all other countries.

261. How has the location of each of the following cities helped to make it important commercially: Cleveland, New York, Boston, Chicago?

Ans. *a)* Lake navigation and railroad centers have made Cleveland; *b)* New York is the port of entry for the entire country; *c)* Boston is the port of the New England States; *d)* the position of Chicago at the head of lake navigation, and the fact that all railroads center there, make it the key of the inland commerce.

262. Where are the four main forest regions of the United States?

Ans. The Appalachian highlands connecting with the Ozark mountain region and east Texas; the region around the three upper Great Lakes; the Rocky mountains and the Sierra Cascade ranges, include the great forest regions of the United States.

263. Give two reasons why manufacturing has become less and less confined to New England and more and more distributed over the whole United States.

Ans. The use of steam as power makes manufacturing possible in any part of the country, and the movement of population westward in the settlement of the country caused manufacturing to spread westward also.

264. Where in the United States is sugar cane extensively grown? Describe a sugar plantation. Mention *two* sources of sugar other than sugar cane. Mention *two* groups of islands where sugar is extensively produced.

Ans. The delta of the Mississippi in Louisiana. Some sugar plantations comprise several thousand acres. The cane is planted in rows about six feet apart and is cut soon after the middle of October. The stalks are drawn to the sugar house, where they are crushed between rollers to squeeze out the juice, which is placed in large vats to evaporate the water, leaving a residue of molasses and sugar. Sugar maple and sugar beet. West Indies and Hawaiian islands.

265. Draw a map of Lake Michigan and indicate by name the position of each of *two* important cities on it. Name the States bordering on this lake, and show on the map the positions of their boundary lines where these lines touch the lake.

Ans. Chicago and Milwaukee are situated on the southwestern shore of Lake Michigan. Wisconsin, Illinois, Indiana, and Michigan border on Lake Michigan. (See text-books for map.)

266. State some of the physical and geographical conditions that account for the commercial supremacy of the United States.

Ans. She has splendid harbors along an extended coast line, a vast extent of fertile lands in the most favored zone of the world; rich mineral deposits; great belts of various kinds of timber; watercourses suited for both manufacturing and commercial purposes. She extends from ocean to ocean, and lies between the most ancient and modern civilizations.

267. Give the location of *five* of the following and state *one* important fact connected with each one selected: Chesapeake bay, Cape Cod, Mount Washington, Duluth, Denver, Pike's peak, Yellowstone National Park, Great Salt lake, Dawson City.

Ans. Chesapeake bay, in central part of Maryland, noted for its great quantities of oysters. Cape Cod, on eastern coast of Massachusetts, noted for its cod fisheries. Mount Washington, in central New Hampshire, highest peak of White mountains. Duluth, in northeastern part of Minnesota, principal lake port. Denver, in north-central part of Colorado, noted as a health resort. Pike's peak, in central Colorado, one of the highest elevations of the Rocky mountains. Yellowstone National Park, in northwestern Wyoming, containing geysers, hot springs, and mud volcanoes, etc. Great Salt lake, in north-central part of Utah; its waters are so salt that fish cannot live in it. Dawson City, in Alaska, noted for its gold fields.

268. Mention *three* products of British America that are exported in large quantities to the United States; *three* products of the United States that are exported in large quantities to British America.

Ans. Exports of British America to the United States are furs, fish, grindstones, etc. Exports of United States to British America are manufactured goods, machinery, cotton.

269. Name a State in which each of the following-named articles is an important product: *a)* Cotton; *b)* wheat; *c)* sugar cane; *d)* rice; *e)* corn.

Ans. *a)* Cotton is produced most extensively in Texas, Mississippi, Georgia, Alabama, and South Carolina. It is an important product in Louisiana, Arkansas, Florida, North Carolina. *b)* Wheat is raised most extensively in Minnesota, Kansas, North Dakota, Ohio, and Indiana. It is an important product in all the

middle and central western States, and also in Virginia, West Virginia, Texas, and Kentucky. *c*) Sugar cane is produced in Louisiana, Texas, Florida, and Georgia. *d*) Rice is produced in South Carolina, Mississippi, Louisiana, North Carolina, Georgia, Alabama, Florida. *e*) Corn is produced in Iowa, Illinois, Missouri, Texas, Nebraska, and in all northeastern States except Maine; in all middle and south Atlantic and all States in Mississippi valley.

270. Mention *two* States that bound *a*) Florida on the north, *b*) Kentucky on the east, *c*) Minnesota on the west, *d*) Nebraska on the south, *e*) Idaho on the west.

Ans. *a*) Alabama and Georgia; *b*) West Virginia and Virginia; *c*) North Dakota and South Dakota; *d*) Colorado and Kansas; *e*) Washington and Oregon.

271. Mention *two* leading industries of *a*) Massachusetts, *b*) Pennsylvania, *c*) Louisiana, *d*) Oregon, *e*) Colorado.

Ans. *a*) Shoes and cotton goods; *b*) coal and iron; *c*) growing sugar cane and cotton; *d*) lumber and salmon; *e*) mining gold and silver, and lumbering.

272. Describe the climate of southern California as to *a*) temperature, *b*) prevailing winds, *c*) rains. By what means has agriculture been made successful in this section?

Ans. *a*) Moderate; *b*) from the ocean; *c*) heavy in winter and spring. By irrigation.

273. Name *a*) two rivers, *b*) the highest mountain, *c*) the chief seaport, *d*) two capes, and *e*) two important productions of North Carolina.

Ans. *a*) Cape Fear, Neuse; *b*) Mount Mitchell; *c*) Wilmington; *d*) Hatteras, Lookout, Fear; *e*) naval stores, lumber, rice, cotton, tobacco, sweet potatoes.

274. Name *a*) four States crossed by the Union and Central Pacific railroad; *b*) its terminal cities.

Ans. *a*) California, Nevada, Utah, Wyoming, Nebraska. *b*) San Francisco and Omaha. (San Francisco to Ogden, Central Pacific; Ogden to Omaha, Union Pacific.)

275. Compare Minnesota with Louisiana as to size, surface, and natural products.

Ans. Minnesota contains 83,365 square miles. It is an extensive undulating tableland containing the crest of the great low plain. The principal products are wheat, oats, lumber, and flour.

Louisiana contains 48,720 square miles. It is in the lowest part of the great plain. The surface of the lower Mississippi during the annual floods is several feet higher than the country through which it passes. The products are sugar cane, cotton, and rice.

276. Locate the following and state some important historical fact connected with each: *a*) Lake Champlain; *b*) Boston; *c*) St. Augustine.

Ans. *a*) Lake Champlain is in the northeastern part of New York State, forming the northeastern boundary between that State and Vermont. Here was fought, in 1812, the battle of Lake Champlain. *b*) Boston is in the eastern part of Massachusetts. Here occurred the Boston massacre, September 27, 1768; the Boston Tea Party and the battle of Bunker Hill. *c*) St. Augustine, in the northeastern part of Florida, is the oldest city in the United States.

277. *a*) Between what points does the Northern Pacific railroad extend? *b*) What cities at the termini of the Erie canal?

Ans. *a*) From Duluth or Elkland, Minnesota, to Olympia and Portland, on the Pacific coast. *b*) Buffalo and Albany.

278. Make a sketch map of the eastern coast of the United States between New York and North Carolina, showing the main rivers and bays, and the location of Philadelphia, Baltimore, Washington, Richmond, and Norfolk.

Ans. See map.

279. Name one of the five leading States in the production of *a*) coal; *b*) iron ore; *c*) gold; *d*) sheep; *e*) cotton and woolen goods.

Ans. *a*) Pennsylvania, Illinois, West Virginia, Ohio, Alabama. *b*) Michigan, Minnesota, Alabama, Pennsylvania, Tennessee. *c*) Colorado, California, South Da-

kota, Montana, Nevada. *d*) New Mexico, Montana, Wyoming, Ohio, Idaho. *e*) Massachusetts, Rhode Island, Connecticut, New Hampshire, Pennsylvania.

280. In what river system is *a*) Lake Champlain; *b*) Chautauqua lake; *c*) Mohawk river; *d*) Delaware river?

Ans. *a*) St. Lawrence; *b*) Mississippi; *c*) Atlantic slope; *d*) Atlantic slope.

281. What river is on the boundary between *a*) Pennsylvania and New Jersey; *b*) Vermont and New Hampshire; *c*) Europe and Asia; *d*) the United States and Mexico?

Ans. *a*) Delaware, *b*) Connecticut, *c*) Ural, *d*) Rio Grande.

282. Mention a natural cause that has contributed to the growth of each of the following cities: *a*) Baltimore; *b*) San Francisco; *c*) Rochester; *d*) Syracuse.

Ans. *a*) Commands commerce of Chesapeake bay. *b*) Chief seaport of the Pacific coast. *c*) Water power of Genesee Falls. *d*) Extensive salt works.

283. Mention *two* important seaports of the United States on the Atlantic coast, *one* on the Gulf of Mexico, *two* on the Pacific coast. Give *one* important export from *each* of the ports mentioned.

Ans. New York, Philadelphia, Galveston, San Francisco, Seattle. New York exports machinery; Philadelphia, coal; Galveston, cotton; San Francisco, oranges; Seattle, lumber.

284. Mention a region where irrigation is extensively practiced. State the advantages of irrigation.

Ans. Arizona, California. Fertilizes a large area of land during the dry season, and makes useful territory that would otherwise be arid.

285. Mention *five* important cities on the Mississippi river and give the name of the State in which each is situated.

Ans. Minneapolis and St. Paul, in Minnesota; St. Louis, in Missouri; Baton Rouge and New Orleans, in Louisiana.

286. Mention *three* States of the Union that are noted as wheat-producing States, *three* that are noted as corn-producing States, *two* in which oranges are extensively grown, *two* in which coal is mined.

Ans. Wheat-producing: North Dakota, South Dakota, and Minnesota. Corn-producing: Missouri, Kentucky, and Illinois. Orange-growing: California and Florida. Coal-mining: Pennsylvania and Missouri.

287. Compare the climate immediately west of the Rocky mountains with that east of the same mountains, and give *one* reason for the difference.

Ans. The climate west of the Rocky mountains is warmer and wetter than the climate east of those mountains. It is wetter west of the Rocky mountains because the warm breezes from the Japan current are laden with moisture and the Rocky mountains form a barrier, so that when the winds reach the land east of the mountains they have little or no moisture.

288. Draw in outline the Atlantic coast of the United States.

Ans. See map.

289. On the map drawn in answer to question 1 show the location of *a*) Cape Cod, *b*) Long Island sound, *c*) Delaware bay, *d*) Cape Hatteras, *e*) Rhode Island, *f*) Georgia, *g*) Delaware, *h*) Connecticut, *i*) South Carolina, *j*) Virginia.

Ans. See map.

290. Mention in order the States that would be seen on the west bank of the Mississippi in going from St. Paul to the Gulf of Mexico.

Ans. Minnesota, Iowa, Missouri, Arkansas, and Louisiana.

291. Give the name and location of each of *five* rivers that are on the boundary line of the United States.

Ans. Rainy Lake river, northern Minnesota; St. Lawrence river, northwestern New York; Niagara river, Western New York; St. Croix river, eastern Maine; Rio Grande river, southern Texas.

292. Connect *each* of the following with the name of a State of the Union producing it in large quantities: Wheat, corn, rice, beef, salt, marble, iron, zinc, petroleum, turpentine.

Ans. Wheat, Minnesota; corn, Iowa; rice, Louisiana; beef, Texas; salt, Michigan; marble, Vermont; iron, Michigan; zinc, Missouri; petroleum, Pennsylvania; turpentine, South Carolina.

293. Give the location of *five* of the following and mention a point of interest connected with each one selected: Annapolis, Norfolk, Auburn, Pittsburg, New Haven, New Orleans, Salt Lake City, San Francisco.

Ans. Pittsburg, in the western part of Pennsylvania, at the junction of Allegheny and Monongahela rivers; it is in the petroleum district. New Haven, southern part of Connecticut, on Long Island sound; summer resort. New Orleans, southeastern part of Louisiana, on Mississippi; cotton market. Salt Lake City, northwestern part of Utah, on the Jordan river; capital of Utah. San Francisco is located in the western part of California, on San Francisco bay; largest city on the Pacific slope.

294. Mention in order the States that are bounded on the east, wholly or in part by the Mississippi river.

Ans. Minnesota, Iowa, Missouri, Arkansas, and Louisiana.

295 Write an account of *one* of the following: Sheep-herding in Wyoming, hydraulic mining, cotton-growing in Texas.

Ans. *Cotton-growing in Texas.* The seeds are planted from two to three feet apart and the plants grow to the height of about three feet. There are blossoms on the cotton plant that change their colors. These blossoms contain a boll in which the cotton seed and the cotton are formed later. The cotton is picked in September and October, mostly by negroes. The cotton plant requires a warm climate with plenty of rainfall. The cotton is used for the manufacture of cotton goods, and the cotton seed is used to make cotton-seed oil.

296. Trace an all-water route from New York city to a) Philadelphia, b) Montreal, c) St. Louis.

Ans. a) Through New York bay, the Atlantic ocean, Delaware bay, and Delaware river. b) Hudson river, Champlain canal, Lake Champlain, Richelieu or Sorel river, St. Lawrence river. c) New York bay, Atlantic ocean, Gulf of Mexico, Mississippi river.

297. a) What river drains much of the northwestern part of the United States? b) For what industry is it noted?

Ans. a) The Columbia. b) Salmon fisheries.

298. Draw a sketch map of the United States coast on the Gulf of Mexico, indicating position of the bordering States and locating five important seaport towns.

Ans. See map.

299. Compare the climate of Oregon with that of New England, and state reasons for answer.

Ans. The climate of Oregon is warmer than that of New England. This is due to the influence of the warm Japan current upon Oregon, while New England is affected by the cold Labrador current.

300. Name a section of the United States where farmers are particularly troubled from a) lack of rainfall; b) river overflows; c) worn-out soil; d) swamp lands; e) stony surface.

Ans. a) The States of the great interior basin; b) in the Ohio and the Mississippi valleys; c) New England; d) Southern Atlantic States; e) New England and Middle Atlantic States.

301. Name the first three commercial cities of the United States.

Ans. New York, Boston, New Orleans.

302. Which city on the Mississippi river has the greatest natural advantages for a) manufacturing; b) commerce? c) Give reasons for answers.

Ans. a) Minneapolis; b) New Orleans. c) Minneapolis has superior facilities for manufacturing on account of its abundant water power; and New Orleans, situated near the mouth of the Mississippi, is the great center of commerce of the entire Mississippi valley.

303. What State of the Union whose population was at one time decreasing will probably be benefited by irrigation?

Ans. Nevada.

304. Give name and location of each of the following: *a*) Two seaports on the Atlantic coast, south of the latitude of New York; *b*) one seaport on the Gulf of Mexico; *c*) two seaports on the Pacific coast.

Ans. *a*) Norfolk, Virginia, at the entrance of Chesapeake bay; Savannah, Georgia, at the mouth of the Savannah river; *b*) Mobile, Alabama, on Mobile bay; *c*) Portland, Oregon, on Puget sound; San Francisco, California, on San Francisco bay.

305. Name three canals in the United States and mention the waters connected by each.

Ans. The Erie canal connects Lake Erie with the Hudson at Albany. The Ohio Falls canal carries vessels around the falls of the Ohio river at Louisville, Kentucky. The Illinois and Michigan canal connects Lake Michigan, by the Chicago river, with the Mississippi system, by the Kankakee.

306. Where is the great manufacturing section of the United States, and what natural advantages does it possess for manufacturing?

Ans. The northeastern section is the great manufacturing section. There are many short rivers with falls in them which give natural water power, and the coal mines of the Appalachian mountains supply the manufacturing districts with coal. There is also good means of transportation by means of the ocean.

307. Name in order of size and locate the five largest cities in the United States.

Ans. 1. New York. 2. Chicago. 3. Philadelphia. 4. St. Louis. 5. Boston.

New York City is in the southeastern part of New York. Chicago is in the northeastern part of Illinois. Philadelphia is in the southeastern part of Pennsylvania. St. Louis is in the eastern part of Missouri. Boston is in the eastern part of Massachusetts.

308. Name a section of the United States where farmers are particularly troubled from lack of rainfall,

river overflows, worn-out soil, swamp lands, stony surface.

Ans. The arid land in the west and southwest, particularly Colorado and New Mexico, has scanty rainfall. The farmers of the Ohio and Mississippi valleys are troubled by freshets. Much of the soil in the New England States is said to be worn out. Parts of northwestern Ohio and northern Indiana are troublesome swamps; also Florida is a notable example. Parts of New York, Pennsylvania, Colorado, and Nevada are covered by rocks.

309. Give the name and location of each of *five* important cities east of the Mississippi river and south of the latitude of Washington. State an important fact concerning each.

Ans. Key West, southern point of Florida on Florida Keys; important trade in tobacco and cigars. Memphis is an important river port of Tennessee; it is in the southwestern part on the Mississippi river. St. Augustine, in northeast Florida, is one of the oldest cities of the United States. Norfolk, in the southeast part of Virginia; a large United States navy yard is located near. Tallahassee, in the northwest part of Florida, is the capital.

310. What river is on the boundary between *a*) Washington and Oregon; *b*) California and Arizona; *c*) Minnesota and North Dakota; *d*) Louisiana and Texas?

Ans. *a*) Columbia; *b*) Colorado; *c*) Red River of the North; *d*) Sabine.

311. Mention an important production of *a*) Vermont; *b*) Massachusetts; *c*) Ohio; *d*) Kentucky; *e*) Minnesota.

Ans. *a*) Dairy products, wool, marble, maple sugar; *b*) boots and shoes, cotton and woolen manufactures; *c*) coal, iron, pork, furniture; *d*) coal, iron, tobacco, hemp, flax; *e*) timber, wheat, rye. Take any one in each case.

South America.

312. Quito is located at the equator; Havana is almost due north and very near the tropic of cancer.

What is the approximate number of miles from Quito to Havana?

Ans. 1,625 miles.

313. Locate *a)* the Llanos of South America; *b)* Selvas; *c)* the Pampas. What great river drains each?

Ans. The Llanos are the grassy plains of Venezuela, and are drained by the Orinoco river. The Selvas are the forest plains of Brazil, and are drained by the Amazon river. The Pampas are in Argentine Republic in the valley of the La Platte river, which drains them.

314. Name and give the location in South America of *a)* three capes; *b)* three large rivers; *c)* a lake.

Ans. *a)* Cape Horn, at the southern extremity; Cape Gallinas, at northern extremity; Cape St. Roque, at or near eastern extremity. *b)* Orinoco, in northern part in Venezuela; Amazon, in northern part of Peru and Brazil; La Platte, in southern part between Uruguay and the Argentine Republic. *c)* Lake Maracaybo, in the northern part of Venezuela.

315. What countries of South America border on *a)* the Atlantic; *b)* the Pacific; *c)* the Caribbean sea? *d)* What two are inland?

Ans. *a)* Guiana, Brazil, Uruguay, Argentine Republic; *b)* Colombia, Ecuador, Peru, Chili; *c)* Colombia, Venezuela; *d)* Paraguay, Bolivia.

316. *a)* What country of South America includes the greater part of the Orinoco basin? *b)* Name the two chief cities of this country.

Ans. *a)* Venezuela. *b)* Caracas and Valencia.

317. Mention *three* countries of South America wholly in the torrid zone, *two* partly in the torrid zone and partly in the south temperate zone, *one* wholly in the south temperate zone.

Ans. Torrid zone: Colombia, Venezuela, British Guiana. South temperate and torrid: Chili and Brazil. South temperate: Uruguay.

318. Why does the northern part of Chili have little rainfall while the southern part has sufficient rainfall?

Ans. The northern part of Chili receives the trade winds from the Atlantic. These winds in crossing the Andes in the eastern part of Chili become extremely dry. The southern part of the country receives the counter trade winds of the South Pacific which are laden with moisture which is all left west of the Andes in Chili.

319. Compare the Pacific slope of South America with the Atlantic slope of South America as to a) extent, b) climate.

Ans. The Atlantic slope of South America has more indentations than the Pacific and is therefore longer. The climate of the Atlantic slope is milder than that of the Pacific slope. The Pacific slope is very warm especially in Peru, where there is a hot strip of desert land.

320. Why is the Amazon at present, and why is it likely to remain, commercially of less importance than the Mississippi?

Ans. The torrid climate of the Amazon basin is a drawback that prevents and will long hinder the commercial development of that region to the extent reached in the Mississippi basin.

321. Write an account of South America, describing its highlands, lowlands, coast line and river systems. Mention the chief commercial products of each of *four* sections of the continent.

Ans. The principal highlands are along the west coast, in eastern Brazil, and between the Amazon and Orinoco rivers. The remainder of the continent is lowland, consisting mainly of a vast plain extending from Argentina to the Caribbean sea. The coast of South America is very regular, especially on the west coast, and has few good natural harbors.

Chile, on the west coast, exports niter and copper; Argentina, in the southeast, exports hides, wool and wheat; Brazil, in the central part, exports coffee, sugar, hides, tobacco and diamonds; Venezuela, in the north, exports coffee, hides and asphalt.

322. Describe *three* important rivers of South America, stating where each rises, the direction in which it flows, the territory which it traverses, the body of water into which it flows.

Ans. Amazon river rises in Peru, flows through Brazil, general direction east, empties into the Atlantic ocean. Orinoco rises in Colombia, flows through Venezuela, general direction east, empties into the Atlantic ocean. Madeira river rises in Bolivia, flows through Brazil, general direction north, empties into the Amazon river.

323. Connect each of the following with the name of a South American country producing and exporting it in large quantities: Pepper, guano, tallow, copper, cocoa, niter, coffee, ornamental woods, dyewoods, silver.

Ans. Pepper, French Guiana; guano, Peru; tallow, Argentina; copper, Chile; cocoa, Brazil; niter, Chile; coffee, Brazil; ornamental woods, Brazil; dyewoods, Brazil; silver, Chile.

324. Locate in South America a) a rainless region; b) a region of great rainfall. c) State a cause of the condition in each region.

Ans. a) The western slope of the Andes between the equator and the tropic of Capricorn and the Patagonian plains in the southern part of Argentina are the two rainless regions in South America. The Andes mountains interfere with the trade winds so that in the western slopes of the Andes between the equator and the tropic of Capricorn the prevailing winds are from the south and parallel to the coast. As these winds are in the direction toward the equator they become steadily warmer and do not give up their moisture to form rain. In southern Chile the prevailing winds are the westerlies and in rising over the land cause great rainfall, but are robbed of their vapor in crossing the Andes and descend on the Patagonian plains as dry winds. b) The vicinity of the equator, the northern coast, the highlands in eastern Brazil, the eastern slopes of the Andes above the tropic of Capricorn and the southern part of Chile are regions of great rainfall. The vicinity of the equator is in the belt of the calms—the most rainy belt of the earth. The air of this belt is hot and heavily laden with moisture. It is rising and cooling and produces great rainfall. The trade winds from the ocean sweep the northern coast. These winds gather great moisture from the ocean. They must rise to pass over the slopes and becoming cooled cause rainfall. For similar reasons the southeast trade winds cause rainfall in eastern Brazil. These winds on reaching the Andes are forced to a great height and cause rainfall on the

eastern slopes. The southern part of Chile receives the westerlies and in rising over the Andes they cause great rainfall in this vicinity.

325. Name three leading commercial products of South America. *b)* Name and give the location of the chief export city for each product.

Ans. *a)* Coffee, hides, nitrates. *b)* Coffee is exported from Rio de Janeiro, located on the southeastern coast of Brazil; hides from Buenos Ayres, in the eastern part of Argentine Republic; nitrates from Iquique, on the western coast of Chile.

326. Why are there so many people of Spanish origin in South America and the West Indies?

Ans. These countries were colonized by Spain.

327. Name the exports and imports of Brazil.

Ans. The principal are: Exports — Coffee, rubber, tobacco, hides, cacao, diamonds. Imports — Breadstuffs, meats, coal, machinery, textile fabrics.

328. Which of the great river valleys of South America do you consider best adapted for the support of a large population? Give reasons.

Ans. The La Plata and its tributaries. The climate is temperate. The soil, which is level and fertile, is adapted to grain raising and grazing.

329. What port of South America would a ship enter to obtain a cargo of *a)* tallow and hides; *b)* guano; *c)* niter; *d)* rubber; *e)* coffee?

Ans. *a)* La Plata, Buenos Ayres, Montevideo; *b)* Callao or Valpariso; *c)* Callao, Valpariso, Iquique; *d)* Para; *e)* Bahia, Rio Janeiro and Santos.

330. Mention *three* states of South America that are drained in part by the Amazon river. Give the name and location of the capital of *each* of the states mentioned.

Ans. Peru, Ecuador and Brazil. The capital of Peru is Lima, in the western part, on the Plateau. The capital of Ecuador is Quito, in the northwestern part. The capital of Brazil is Rio Janeiro, in the southeastern part on the Atlantic ocean.

331. Mention *five* countries of South America and give with regard to each *a*) location, *b*) name and location of capital, *c*) form of government.

Ans. Brazil is in the east-central part of South America. The capital is Rio Janeiro, in the south-eastern part on the Atlantic ocean. Brazil is a republic. Chile is in the southwestern part on the Pacific ocean. The capital is Santiago, in the north central part. Chile is a republic. Venezuela is in the northern part of South America. The capital is Caracas, in the north-eastern part, on the Caribbean sea. Venezuela is a republic. Argentine Republic is in the southern part of South America. Its capital is Buenos Ayres, in the eastern part on the Atlantic ocean. The government is a republic. British Guiana is in the northeastern part of South America. Its capital is Georgetown on the Atlantic ocean. The country is under British rule.

332. Mention *five* states of South America, giving the capital and *one* leading product of each.

Ans. Venezuela; Caracas; asphalt. Peru; Lima; gold and silver. Chili; Santiago; copper. Brazil; Rio Janeiro; coffee. Argentine Republic; Buenos Ayres; cattle.

333. Name three important products of South America, *a*) forests, *b*) fields and farms, *c*) mines.

Ans. *a*) Lumber, india-rubber, birds of plumage; *b*) coffee, cotton, sugar; *c*) gold, silver, diamonds.

334. What island lies off the mouth of the Orinoco river? *b*) To what country does it belong? *c*) For what product is it especially noted?

Ans. *a*) Trinidad, *b*) Great Britain, *c*) asphalt.

Europe.

335. Describe the surface and drainage of *a*) Austria, *b*) Spain.

Ans. *a*) Austria-Hungary is surrounded and crossed by mountain ranges, which enclose the low, fertile plains of Hungary. The Danube enters and leaves these plains through gaps in the mountains. The country has a short seacoast on the Adriatic sea which is separated from the rest of the country by mountains. It is drained by the Drave, Save and Theiss rivers into the great waterway, the Danube. *b*) Spain is largely

mountainous table lands, with narrow fertile river valleys. More than half its surface is drained by the Guadalquivir, Guadiana, Tagus, Douro, into the Atlantic, and the remaining portion by the Ebro, Guadalquivir, Jucar, Segura into the Mediterranean.

336. Name a city of England noted for the manufacture of *a*) cotton goods; *b*) woolen goods; *c*) steel and cutlery.

Ans. *a*) Manchester; *b*) Leeds; *c*) Sheffield.

337. Give two reasons why the winters of Central Russia are so intensely cold.

Ans. Remoteness from warm ocean currents, exposure to cold Arctic winds.

338. What is the chief article of export from Odessa? Name the bodies of water through which a vessel would pass in taking a cargo from that port to London.

Ans. Wheat. Black sea, Strait of Bosphorus, Sea of Marmora, Strait of Dardanelles, Aegean sea, Archipelago, Mediterranean sea, Strait of Gibraltar, Atlantic ocean, English channel, Strait of Dover, Thames river.

339. What is the chief country of Europe in the production of *a*) wheat; *b*) tin; *c*) in the manufacture of silk goods; *d*) in the manufacture of cotton and woolen goods?

Ans. *a*) Russia; *b*) England; *c*) France; *d*) England.

340. Give the names and location of *a*) three peninsulas of Europe; *b*) three islands of the Mediterranean; *c*) three seas which indent the European coast.

Ans. *a*) Scandinavian, in the northern part; Spanish, in the southwestern part; Italy, in the southern part. *b*) Corsica and Sardinia west of Italy; Sicily southwest of Italy. *c*) White sea, north of Russia; Caspian, south of Russia; Adriatic, between Italy and Turkey.

341. Name and locate *a*) four important mountain chains of Europe; *b*) four important rivers; *c*) four important seaports.

Ans. a) Alps, northern boundary of Italy; Pyrenees, between France and Spain; Caucasus, southern boundary of Russia; Ural, on eastern side of Russia, forming a part of the boundary between Asia and Europe. b) Volga rises in central part of Russia, flows southeast into Caspian sea; Rhine rises in Switzerland, flows north through German Empire and the Netherlands into North sea. Rhone, eastern part of France, flows south into Mediterranean sea. The Danube rising in southern Germany, flowing across Austria-Hungary and the Balkan peninsula into the Black sea. Marseilles, southwestern coast of France; Naples, on the southwestern coast of Italy.

342. Name and give the location of four important peninsulas of Europe.

Ans. Scandinavian, northern part; Iberian or Spanish, southeastern part; Italy, southern part; Greece, southern part.

343. Mention in order the waters that would be traversed in going from London to St. Petersburg.

Ans. From London to St. Petersburg: Thames river, North sea, Cattegat, Skager Rack, Baltic sea, Gulf of Finland and Neva river.

344. Give the location of a) London; b) Liverpool; c) Edinburgh; d) Glasgow; e) Dublin.

Ans. a) In the southeastern part of England on the Thames river; b) in the northwestern part of England on the coast; c) in the southeastern part of Scotland on the Firth of Forth; d) in the southwestern part of Scotland, at the mouth of the Clyde river; e) on the eastern coast of Ireland on the Irish sea.

345. Name two republics, two absolute monarchies, and four limited monarchies of Europe; and give the title of the chief ruler of each.

Ans. France and Switzerland are republics, and their chief ruler is styled President. Russia is an absolute monarchy, and its chief ruler is called Czar. Limited monarchies — British Empire, ruler styled King and Emperor; German Empire, Kaiser; Belgium, King; Italy, King.

346. Name and give general course of the following rivers: a) Two flowing into the Caspian sea; b) three into the Black sea; c) one into the Sea of Azof.

Ans. a) The Volga, flowing east, southwest and southeast; the Ural, flowing south, west and south; b) the Danube, flowing east; the Dniester, southeast; the Dnieper, south; c) the Don, flowing southeast and southwest.

347. Locate in the German Empire a) an educational center; b) a famous river; c) a trading port; d) extensive forests.

Ans. a) Leipzig, in the northern part of the kingdom of Saxony, which is in the central part of Germany. b) The Rhine, which flows through the western part of Germany from south to north. c) Hamburg, in the northwestern part, on the Elbe. d) The Black Forests in the southwestern part.

348. What five bodies of water border the Scandinavian peninsula?

Ans. The Arctic and Atlantic oceans, North and Baltic seas, and the straits of Skager Rack, Cattegat and The Sound.

349. Describe a) the dikes of Holland, b) the canals of Holland. State the main purpose of each.

Ans. a) The dikes of Holland are composed of land and stones; they are sometimes broad enough for quite a few people to walk abreast on them; they are sometimes as high as a house. The dikes are used to prevent the sea from coming into Holland and overflowing it. b) Wherever you look in Holland you see canals, they look like silver ribbons, drawn over the country. The canals are sometimes used instead of streets. The canals are used for transporting goods and other articles.

350. Explain briefly industrial and mineral resources of Russia.

Ans. Russia's greatest industry is farming. Her manufactures are not important. In the north many of her people engage in fishing, hunting and lumbering.

351. Where is Stockholm? Milan? Odessa? Southampton? Antwerp?

Ans. a) Sweden; b) Italy; c) Russia; d) England; e) Belgium.

352. Name and locate three European cities which have famous cathedrals.

Ans. London, Rome and Moscow.

353. Upon what does the climate of England depend?

Ans. The west winds warmed by their passage over the ocean moderate the climate of Great Britain greatly as compared with places in the same latitude on the west side of the ocean. The gulf stream brings large quantities of warm water into the north Atlantic ocean.

354. How does the government of England resemble that of the United States? Name an important difference between these two forms of government.

Ans. The governments of Great Britain and the United States are alike in having executive, legislative and judicial branches. The British chief executive, the King, holds his office by hereditary right, while the president, the chief executive of the United States, is elected. The upper house of Parliament is composed of members holding office by reason of their belonging to the nobility or being high officials in the Church of England, while the members of the senate, our upper house of Congress, are chosen by the legislatures of the different States of the Union.

355. Give the name and the location of each of *five* important seaports of Europe. Mention an important export from each of the ports named.

Ans. Havre, situated at the mouth of the Seine in northern France; exports silk and woolens. Liverpool, on western coast of England; exports manufactured goods. Valencia, in eastern Spain; exports silks. Oporto, in northwestern Portugal; exports port wine. Odessa, on the Black sea in southern Russia; exports grain.

356. Through what straits and seas does the water of the Black sea pass before reaching the ocean?

Ans. Strait of Bosphorus, Sea of Marmora, Strait of Dardanelles, Ægean sea, Mediterranean sea, Strait of Gibraltar.

357. Name a city of Italy noted for *a)* its being the birthplace of Columbus; *b)* its beautiful bay; *c)* its works of art; *d)* its location on a number of islands.

Ans. *a)* Genoa; *b)* Naples; *c)* Rome; *d)* Venice.

358. a) What river of France flows into the Mediterranean sea? b) What city is located on this river, and c) for what is it noted?

Ans. a) Rhone; b) Lyons; c) silk manufactures.

359. For what is Cologne noted? Florence? Liverpool? Venice? Dresden?

Ans. Cologne is the site of a grand cathedral. Florence, Venice, and Dresden have famous art galleries, and Liverpool has immense docks and great shipping interests.

360. Draw a rough sketch map of Italy, indicating on it five cities and towns, and mention some geographic or historic fact connected with three of the five towns.

Ans. Rome, once the seat of a great military empire, still the capital of Italy, and the center of the Roman Catholic religion; Venice, built on the islands of the Adriatic, with canals for streets; Naples, near the volcano of Vesuvius, and the buried cities of Herculaneum and Pompeii; Florence; Genoa.

361. A coasting vessel sails from St. Petersburg to Gibraltar, keeping the mainland on the left. Mention in order the waters it will traverse and the countries it will pass.

Ans. Baltic sea, the sound, North sea, Dover strait, English channel, Atlantic ocean. Norway, Germany, Belgium, Holland, England, France, Portugal.

362. Give the location of each of the following and mention one important fact connected with each: Corsica, Mont Blanc, Vesuvius, Athens, Caspian sea.

Ans. Corsica, in western part of Mediterranean, celebrated as the birthplace of Napoleon. Mont Blanc, in eastern France, highest summit of the Alps mountains. Vesuvius, a famous volcano in western Italy. Athens, in eastern Greece, once the center of art and learning, and the birthplace of many renowned philosophers. Caspian sea, in western Asia, the largest salt lake in the world.

363. a) Name two mountain ranges of the Spanish peninsula and state the direction in which each extends. b) What bodies of water touch this peninsula?

Ans. a) Any two of the following: Cantabrian, Sierra Nevada, Sierra Morena, Sierra de Guadarrama, which extend east and west. The Pyrenees, between Spain and France, which extend east and west. The Iberian, which extend northeast and southwest. b) Bay of Biscay, Mediterranean sea, Strait of Gibraltar, and Atlantic ocean.

364. a) Name two minerals extensively mined in Belgium; b) two manufactured articles for which that country is especially noted.

Ans. a) Coal, iron; b) lace goods, iron and steel goods, glass.

365. a) In what general direction do the highlands of southern Europe extend? b) Give the location of four mountain chains of this region.

Ans. a) East and west. b) Cantabrian mountains are located in the northern part of Spain; Pyrenees, between France and Spain; Swiss Alps, between Switzerland and Italy; Carpathian extend from the north-central to the eastern part of Austria-Hungary.

366. a) Of what region are the Aral and the Caspian seas the reservoirs? b) What two large rivers empty into the Caspian? c) Why is the water of these seas salt?

Ans. a) The Aral and Caspian seas are the reservoirs of eastern Russia and the plain of Turkestan. b) Volga and Ural. c) These seas are below sea level and therefore have no outlets. Their waters are chiefly lost by evaporation. Lakes or seas of this class are usually salt because their affluents carry salt in solution washed from the soil by the rainfall.

367. Why is England able to manufacture so extensively? In what part of the country are the great manufacturing industries? Name the three chief manufactures.

Ans. England is favorably situated for commerce, *i. e.*, "at the center of the land hemisphere," and had to begin with vast resources of coal and iron. The intelligence of her statesmen and people foresaw the advantages to be derived by building up great manufactures to supply what were a hundred years ago the newly-settled and partly-civilized countries of the world,

in exchange for food products and raw materials, and the immense increase in wealth in that country is largely the profits of this exchange. Manchester manufactures cotton; Birmingham, iron; Sheffield, cutlery; Leeds and Nottingham, woolens. The three leading manufactures are iron, cotton, and woolen goods.

368. Compare Holland and Switzerland as to elevation, drainage, surface, occupations, government.

Ans. Holland is very low, part of it below sea level and protected by dikes; it is drained by sluggish streams and canals, the water in places being pumped by wind and steam power into the canals. Its people are engaged in commerce, manufactures, and agriculture, the government is a limited monarchy. Switzerland is an elevated, mountainous region drained by swift rivers. Its people engage in dairy and manufacturing. The government is a republic.

369. What countries join Switzerland? Name and locate the capital of each of these countries.

Ans. France, Paris, on the Seine; German Empire, Berlin, north-central part; Austria, Vienna, on the Danube; Italy, Rome, on the Tiber.

370. Why is England so great a manufacturing center?

Ans. Because of her vast fields of coal and iron ore, her comparatively small size and great population, and her position by which she can dispose of her goods through the channels of commerce.

371. Describe briefly the industrial life of Germany.

Ans. About nine-tenths of Germany is productive land, yielding agricultural riches. Amongst European countries she stands next to Great Britain in coal and iron ore, and she has also copper, lead, silver, glass sand, porcelain clay, salt, and leads the world in zinc production.

She is a great manufacturing nation in food products, woolens, cottons, silks, linens, hardware, porcelain, and wooden articles.

She is a great commercial nation, and is noted for her railroads, canals, ship canals, and navigable rivers, and her employment of the same.

372. What mountain range is located in a) Italy; b) Austria; c) Spain?

Ans. a) Apennines; b) Carpathian; c) Cantabrian.

373. Name the metropolis of Scotland and tell for what it is noted.

Ans. Glasgow. Shipbuilding and manufacture.

374. Describe the drainage of France.

Ans. The Seine drains the northeast, the Rhone the east, and the Loire and Garonne the center and west. The Seine flows into the English channel, the Rhone into the Mediterranean, and the Loire and Garonne into the Bay of Biscay.

375. Name the three great manufacturing and commercial nations of Europe, and mention some special product for which each is noted.

Ans. England, Germany, France. England, cutlery; Germany, firearms; France, wines.

376. Locate the following islands and state to what country each belongs: a) Madagascar; b) Iceland; c) Jamaica; d) Java.

Ans. a) Off eastern coast of Africa; belongs to France. b) Northwest of England; belongs to Denmark. c) Jamaica, in Caribbean sea, south of Cuba; belongs to England. d) Southeast of Asia; belongs to Holland.

377. Mention in order the countries of Europe bordering on the Mediterranean sea, giving the form of government and the capital of each.

Ans. The countries of Europe that border on the Mediterranean sea are Spain, France, Italy, Austria-Hungary, Turkey, and Greece. The government of Spain is a limited monarchy, and the capital is Madrid. The government of France is a republic, and the capital is Paris. The government of Italy is a limited monarchy, and the capital is Rome. The government of Austria-Hungary is a limited monarchy, and the capital is Vienna. The government of Turkey is an absolute monarchy, and the capital is Constantinople. The government of Greece is a limited monarchy, and the capital is Athens.

378. Give the name and the location of each of *five* of the following: a) A city in Great Britain noted for

its shipbuilding, *b*) a city in Germany noted for its manufacture of cannon, *c*) a city in Italy noted for its canals, *d*) a city in Russia noted as a grain market, *e*) a city on the Rhine noted for its cathedral, *f*) a city in Greece noted for its ruins of ancient architecture, *g*) a city in Switzerland noted for its manufacture of watches.

Ans. *a*) Glasgow is in the southwestern part of Scotland, on the Clyde river. *d*) Odessa is in the southwestern part of Russia, on the Black sea. *e*) Cologne is in the western part of Germany, on the Rhine river. *f*) Athens is in the southwestern part of Greece. *g*) Geneva is in the southwestern part of Switzerland, on Lake Geneva.

379. Describe *three* important rivers of Germany and give the name of *one* important city situated on each.

Ans. Frankfort on the Rhine, Bremen on the Weser, Berlin on the Spree.

380. Mention in order the waters that would be traversed in going from London to Bombay.

Ans. Thames river, North sea, Dover strait, English channel, Atlantic ocean, Strait of Gibraltar, Mediterranean sea, the Suez canal, Red sea, Strait of Bab-el-Mandeb, Gulf of Aden, the Arabian sea.

381. Compare France and Spain with respect to *a*) elevation; *b*) moisture; *c*) productivity; *d*) population.

Ans. *a*) Spain is more mountainous and has higher elevation. France has a *b*) moister climate, *c*) is more productive, and *d*) has greater population.

382. What is *a*) the most mountainous country of Europe? *b*) The most densely populated?

Ans. *a*) Switzerland. *b*) Belgium or England.

383. What is *a*) the largest city, *b*) the most noted river, *c*) the chief seaport of Germany?

Ans. *a*) Berlin. *b*) Rhine. *c*) Hamburg.

384. Name *a*) a city, *b*) a mountain, *c*) an important production of Sicily.

Ans. a) Palermo, Syracuse, Messina, Catania — any one; b) Etna; c) sardines, sulphur, sumach, fruits, wine, oil — any one.

385. Name a) a group of islands in the Mediterranean sea belonging to Spain. Name an island in the same sea belonging to b) France; c) Italy.

Ans. a) Balearic; b) Corsica; c) Sicily or Sardinia.

386. Mention *one* European city noted for the manufacture and exportation of *each* of the following: Glassware, fine porcelain, cutlery, silk, cotton cloth, lace, watches, linen goods, iron steamships, hardware.

Ans. Glass, Vienna; porcelain, Dresden; cutlery, Sheffield; silk, Lyons; cotton cloth, Manchester; lace, Brussels; watches, Geneva; linen goods, Belfast; iron steamships, Glasgow; hardware, Birmingham.

387. State a) the form of government of Turkey; b) the title of its ruler; c) its capital; d) two of its chief productions.

Ans. a) Despotism; b) Sultan; c) Constantinople; d) raisins, raw silk, carpets, rugs.

Asia.

388. a) Name three great rivers of India; b) give the general course and outlet of each.

Ans. a) Ganges, Brahmapootra, Indus. b) The Ganges flows southeast into the Bay of Bengal. The Brahmapootra flows east, south, west, and south into the Ganges. The Indus flows southwest into the Arabian sea.

389. a) Name the large lakes of Africa. b) Which one is crossed by the equator?

Ans. a) Victoria Nyanza, Albert Nyanza, Tchad, Tanganyika, Nyassa, Bangweolo. b) Victoria Nyanza.

390. a) Locate the great mountain mass of Asia. Name a river rising in these mountains and emptying into the b) Pacific ocean; c) Arctic ocean; d) Indian ocean.

Ans. a) South-central part of Asia; b) Hoang-Ho, Yang-tze-Kiang, Amoor, Cambodia; c) Obi, Yenesei, Lena; d) Ganges, Indus, Brahmapootra.

391. Give the name and location of *a) one* important river in Siberia, *b) two* important cities in China, *c) one* seaport of India, *d) one* important island in the Indian ocean.

Ans. *a)* The Lena river rises in the north-central part of China and flows into the Arctic ocean. *b)* Pekin is in the northeastern part of China; Canton is in the southeastern part, on the Pacific ocean. *c)* Bombay is in the western part of India on the Arabian sea. *d)* Madagascar is in the Indian ocean, southeast of Africa.

392. Name *three* large rivers of British India and locate the mouth of each.

Ans. Indus river flows into the Arabian sea in the northwestern part of Hindustan. Brahmapootra river flows into the Ganges river in the eastern part of Hindustan. The Ganges river flows into the Bay of Bengal in the eastern part of Hindustan. The Irawadi river flows into the Gulf of Martaban in the southwestern part of Lower Burma.

393. What and where is *each* of the following: Melbourne, Himalaya, Port Arthur, Calcutta, Guam?

Ans. Melbourne is a city in southern Australia. Himalayas are mountains in southern Asia. Port Arthur is a city in southern Manchuria. Calcutta is a city in India. Guam is an island in the Pacific east of the Philippine islands.

394. Describe the Japanese islands, touching on *a)* location, *b)* climate, *c)* principal products, *d)* character of people.

Ans. The Japanese islands are east of Asia. The climate varies from temperate in the north to sub-tropical in the south. The principal products are silk, tea, rice. The people are intelligent, industrious, and quick to learn and adopt the methods of other nations.

395. Name the special characteristics of the Malay race and tell why said race is adapted to live in the country principally inhabited by it.

Ans. The special characteristics of the Malay race are brown skin, prominent cheek bones, slanting forehead, and black hair. They form an indolent class of people and live in a hot climate which has a tendency

to keep them in their idle, easy-going manner of living. Some of them have a roving disposition and living where they do, it gives them good opportunity for traveling from place to place.

396. Name in order from west to east five indentations of the southern coast of Asia.

Ans. The Red sea, Gulf of Aden, Persian gulf, Gulf of Oman, Arabian sea, Bay of Bengal, Gulf of Siam.

397. Name a mountain range, a river, an isthmus, two seas, and two straits which lie on the boundary of Asia, and also on that of some other grand division of land.

Ans. Ural mountains, Ural river, Isthmus of Suez, Black and Caspian seas, Straits of Bab-el-Mandeb and Bosphorus.

398. Name three large countries of Asia which are under European control and state to which European power each belongs.

Ans. India belongs to England; Siberia, to Russia; Asia Minor or Asiatic Turkey, to Turkey.

399. Name and locate five peninsulas on the coast of Asia.

Ans. Arabian peninsula, Hindustan, and Malay peninsula on the southern coast, Korea and Kamchatka on the eastern coast.

400. What waters border on the peninsula of a) Kamchatka; b) Korea; c) Deccan (Hindustan); d) Arabia?

Ans. a) Bering sea, Pacific ocean, Koorile strait, Okhotsk sea; b) Sea of Japan, Korea strait, Yellow sea; c) Bay of Bengal, Palk strait, Indian ocean, Arabian sea; d) Persian gulf, Strait of Ormus, Gulf of Oman, Arabian sea, Gulf of Aden, Strait of Bab-el-Mandeb, Red sea.

401. a) In what general direction do the highlands of Asia extend? b) Where are they highest? Locate, in Asia, c) great plains; d) great desert regions.

Ans. a) East and west; b) the plateau of Tibet, in the southwestern part of the Chinese Empire; c) the great

Siberian plain, covering all of Siberia; the great central high plain in the northern part of the Chinese Empire; the Plain of China, in the eastern part of the Chinese Empire; *d*) the desert Gobi or Shamo, in the Chinese Empire; the Great Salt desert in Persia, the Syrian desert, and the Dahna desert in Arabia.

402. Name *a*) two rivers which cross the plains of China; *b*) one receiving its waters from the south side of the Himalaya mountains; *c*) two flowing northward across Siberia.

Ans. *a*) Hoang-Ho or Yellow, Yang-tze-Kiang; *b*) Ganges; *c*) Lena, Yenesei.

403. Locate a typical city of India. State briefly your idea of the life and appearance of such a city.

Ans. Delhi is a typical Hindu city. It is surrounded by a wall entered by imposing gateways. The streets are narrow and crooked. The bazaars open directly upon the streets and expose their wares to the passers-by. Imposing temples and palaces in great contrast with the residences of most of the people occupy many conspicuous places in the city. The houses are blank walled next to the streets, entrance being through strongly-barred gateways. Few women are seen upon the streets. Oxen, donkeys, and a few elephants plod along slowly with burdens or riders. Monkeys chatter at you from temple walls or gardens, and mendicant priests or helplessly poor and afflicted ask alms as they meet you.

404. *a*) What plateau lies north of the Himalaya mountains? *b*) For what is this plateau noted?

Ans. *a*) Thibet. *b*) It is the highest plateau of such great extent.

405. Describe two of the following: Ganges river, Indus river, Calcutta, Armenia, Ceylon, Siam.

Ans. Ganges river rises in Himalaya mountains, general direction east, empties into the Bengal bay; Indus river rises in Himalaya mountains, general direction west, empties into Arabian sea; Calcutta is a city on eastern coast of Hindustan, Armenia, a province in Asiatic Turkey; Ceylon, an island in Indian ocean south of Hindustan; Siam, a country of Indo-China in southern Asia.

406. Locate *a*) Calcutta; *b*) Bombay; *c*) Singapore; *d*) Hong Kong. *e*) What government controls these places?

Ans. *a*) Calcutta is in the southeastern part of Hindustan on one Hoogly or western channel of the delta of the Ganges. *b*) Bombay is a seaport on the west coast of Hindustan. *c*) Singapore is located on the island of Singapore at the end of the Malay peninsula. *d*) Hong Kong is situated on an island in the estuary of the Canton river. *e*) Great Britain.

407. Name three large rivers draining *a*) the northern slope of Asia; *b*) its eastern slope; *c*) its southern slope.

Ans. *a*) Indigirka, Lena, Yenisei, Obi; *b*) Amoor, Yellow, Yang-tse-Kiang; *c*) Mekong, Ganges, Indus.

408. Name three peninsulas of Asia and the waters each separates.

Ans. Arabia separates Red sea from Persian gulf and Arabian sea; India separates Bay of Bengal and Arabian sea; Korea separates Sea of Japan and Yellow sea.

409. What large river empties into the *a*) Bay of Bengal; *b*) Persian gulf; *c*) Arabian sea?

Ans. *a*) Ganges; *b*) Euphrates; *c*) Indus.

410. *a*) What form of government has Japan? *b*) Name one of its chief cities; *c*) two of its exports.

Ans. *a*) Limited monarchy; *b*) Tokyo, Yokohama, Osaka, Kioto, Hakodate — any one; *c*) raw silk, tea, camphor.

411. Mention five places of interest in Eastern Asia associated with the war with Japan, and why each is of importance.

Ans. Port Arthur, extensive fortifications; Vladivostok, terminus of Trans-Siberian railroad; Seoul, capital of Korea; Mukden, decisive battle won by Japanese; Manchuria, a province greatly desired by Russia.

412. How does China compare with the United States in *a*) extent of territory; *b*) in population? *c*)

With what countries does China carry on trade? *d*) Locate its chief cities.

Ans. *a*) Larger by 600,000 square miles; *b*) greater by nearly 300,000,000. *c*) England, Germany, France, and United States. *d*) Peking, eastern part; Canton, southeastern; Hong Kong, southeastern; Shanghai and Ning Po, eastern part.

413. Name a mountain range, a river, an isthmus, two seas, and two straits which lie on the boundary of Asia, and also on that of some other grand division of land.

Ans. Ural mountains, Ural river, Isthmus of Suez, Caspian and Black seas, Straits of Bosphorus and Babel-Mandeb.

414. Compare China with the United States as to climate, products, civilization.

Ans. Central China is cold and rainless on account of the high altitude, while the eastern part is mild and warm, affected by the Japan current, just as the eastern coast of the United States is affected by the gulf stream. As a whole, China has less rain than the United States. The most important products are rice, millet, tea, and silk, while the United States produces wheat, corn, and other grains, cotton, tobacco, and lumber. The Chinese are industrious, and much attention is given to education, but Americans are more liberal and progressive.

415. Where in Asia would you look for the cultivation of cotton, rice, and wheat?

Ans. Eastern China for cotton and rice; Manchuria for wheat.

416. *a*) Locate the great mountain mass of Asia. Name a river rising in these mountains and emptying into the *b*) Pacific ocean; *c*) Arctic ocean; *d*) Indian ocean.

Ans. *a*) North of India. *b*) Yang-tse-Kiang; *c*) Obi; *d*) Ganges.

417 Mention the four great (northward) projections of the Indian ocean.

Ans. Red sea, Persian gulf, Arabian sea, and Bay of Bengal.

418. Name two great rivers of China; three sea-ports; five exports.

Ans. Hoang-Ho, Yang-tse-Kiang, and Cambodia; Shanghai, Ning Po, and Hong Kong; tea, silk, opium, rice, porcelain

419. Name *three* large rivers of British India and locate the mouth of each.

Ans. Ganges, northeastern part; Indus, northwest-ern; Nerbudda, western, Gulf of Cambay.

420 What large river empties into the a) Bay of Bengal; b) Persian gulf; c) Arabian sea?

Ans. a) Ganges; b) Euphrates; c) Indus.

Africa.

421. a) What colony of Africa is farthest south? b) Name its principal city.

Ans. a) Cape Colony; b) Cape Town.

422. Compare South America and Africa as to con-tour, position, and physical features.

Ans. They are both peninsulas with narrow isthmuses connecting them to the northern continent, having broad bases to the north and running to points in the south. This feature is very pronounced in the case of South America. Both lie on both sides the equator, the major portion of Africa lying north and the major portion of South America south of that line. South America extends approximately from 10° north latitude to 55° south latitude, and Africa from 35° north latitude to 35° south latitude. South America has lofty mountains along its west coast, with broad plains to the east, and along the central east coast other mountains. South Africa is highland, with narrow littoral coasts and a narrow continental divide trending from the equator northwesterly almost to the Atlas mountains in the extreme northwest. On the east coast the mountains continue almost to the extreme north.

423 Locate the lake region of Africa and name three large rivers which have their source in this region.

Ans. The lake region of Africa is in the eastern part of the southern half. The Nile, Kongo, and the Zambesi.

424. a) By what bodies of water is the grand division of Africa separated from the rest of the eastern continent? b) How does its coast line compare in regularity with that of the other grand divisions of the earth?

Ans. a) Strait of Gibraltar, Mediterranean sea, Suez canal, Red sea, Strait of Bab-el-Mandeb, Gulf of Aden. b) Its coast line is the most regular of all the grand divisions.

425. What is a) the chief seaport of Egypt; b) the capital city; c) the title of the chief ruler?

Ans. a) Alexandria; b) Cairo; c) Khedive.

426. a) Sketch the outline of Africa. b) Locate on this sketch the equator and the tropic of Capricorn.

Ans. See map.

427. Give the location of Africa's a) richest mineral section; b) richest agricultural section. c) Name an important city or town and two important products of each section.

Ans. a) The southern part; b) the Nile valley. c) In southern part, Kimberley — products, diamonds, gold; in northern part, Cairo — products, wheat, barley, cotton.

428. What cape at a) the northern point of Africa; b) the eastern; c) the southern; d) the western?

Ans. a) Bon; b) Guardafui; c) Agulhas; d) Verd.

429. a) Name the three largest rivers of Africa. b) Which of these rivers crosses the equator?

Ans. a) Nile, Kongo, Niger; b) Kongo.

430. What a) state, b) lake, c) river, d) bordering gulf, of Africa is crossed by the equator?

Ans. a) Kongo State; b) Lake Victoria Nyanza; c) Kongo river; d) Gulf of Guinea.

431. Egypt is almost rainless, yet in the valley of the Nile it is one of the most productive districts in the world. Explain.

Ans. Annual overflow of the Nile.

432. Describe the Suez canal, mentioning *a*) location, *b*) length, *c*) waters connected, *d*) nations controlling it, *e*) importance to commerce.

Ans. *a*) Northeastern part of Egypt; *b*) 90 miles; *c*) Red sea and Mediterranean sea; *d*) England and France; *e*) shortens the sea route between Asia and Europe by many thousand miles.

433. Write briefly upon agriculture in Egypt, touching on water supply, crops cultivated, and methods of tilling the ground.

Ans. The water supply of Egypt is dependent on the annual overflow of the Nile, which brings down from the mountains rich alluvial deposits. The land is so soft and fertile that it is only necessary to till it with a sharpened stick. Wheat, rice, and barley are produced in abundance, and cotton is the chief crop.

434. Locate in Africa a large section belonging to each of *four* leading nations of Europe and state to which nation each section belongs.

Ans. South Africa, comprising Cape Colony, Orange Free State, Transvaal, and Rhodesia, belongs to Great Britain. German East Africa, in the southeastern part of Africa, belongs to the German Empire. Portuguese West Africa, in the southwestern part of Africa, belongs to Portugal. The French Kongo, in the southwestern part of Africa, belongs to France. (Other answers may be given.)

435. Give the location of two fertile regions in Africa and account for the peculiar fertility of each.

Ans. The valley of the Nile, in the northeastern part, because of the annual overflow of the river; and the lake region of Central Africa, on account of heat and moisture.

436. Give three reasons for the uncultivated condition of the country, and uncivilized condition of the people of much of Africa.

Ans. Africa has few navigable rivers, few good harbors, a hot climate, and extensive deserts.

437. Give five causes for our limited knowledge of Africa.

Ans. Climate, character of the inhabitants, jungles, deserts, and wild animals. All of these make traveling dangerous.

438. Describe the shortest all-water route from Cairo to Cape Town.

Ans. Nile river, Suez canal, Red sea, Gulf of Aden, Indian ocean, Mozambique channel.

439. How does Africa compare with South America in size and population? Name two countries of Africa in west longitude and three cities of Africa in north latitude.

Ans. Almost twice as large and has five times as much population as South America. Morocco and Liberia; Tunis, Tripoli, and Cairo.

440. What *a*) island, *b*) river, *c*) bordering channel of Africa is crossed by the Tropic of Capricorn.

Ans. *a*) Madagascar, *b*) Limpola, *c*) Mozambique.

441. What constitute the British South African possessions? In what does their great value lie?

Ans. Cape Colony, Natal, Orange River Colony, Transvaal, and Rhodesia. Valued for their great mineral wealth.

442. *a*) In what zones does Africa lie? *b*) What waters bound it?

Ans. *a*) North temperate, torrid, and south temperate. *b*) Atlantic ocean, Indian ocean, Mediterranean and Red seas.

443. Locate in Africa a large section belonging to each of *four* leading nations of Europe and state to which nation each section belongs.

Ans. Kongo Free State, to Belgium; East African State, to Portugal; Orange Free State, to Great Britain; Madagascar, to France.

444. a) What countries are called the Barbary States? b) Give the location of these countries in order from west to east.

Ans. a-b) Morocco, Algeria, Tunis, Tripoli.

Oceanica.

445. a) Name and give the location of the two most productive provinces of Australia. b) Name the capital city and state an important export of each.

Ans. a) Victoria and New South Wales, both in southwestern part. b) Melbourne; gold. Sydney; wool.

446. What season of the year is it at Melbourne at Christmas? Explain.

Ans. Summer in Melbourne at Christmas; because Christmas is on December 25th, and sun is vertical on the tropic of Capricorn December 21st.

447. a) Name two leading products of Australia. b) What parts are most productive?

Ans. a) Gold and wool. b) Southern and eastern parts.

448. Name the two chief cities of Australia. In what part of the country is each located?

Ans. Melbourne, in the southern part of Victoria; Sydney, in the eastern part of New South Wales.

449. a) Name four political divisions of Australia. b) Which two are most important?

Ans. a) Victoria, New South Wales, Queensland, West Australia, South Australia, Northern Territory. b) Victoria, New South Wales.

450. a) Mention three products for which Australia is noted. b) Of what empire is Australia a part? c) What large island near to and directly north of Australia?

Ans. a) Copper, cotton, wool. b) British Empire. c) New Guinea.

451. Describe Australia as to climate and leading industries.

Ans. Northern and western parts tropical; southern part mild, but variable; extremes of temperature, with destructive floods and droughts. Agriculture and mining.

452. How does Australia compare with the United States in area?

Ans. About as large, excluding Alaska.

453. Describe the coast line and land surface of Australia.

Ans. Regular outline. No seas, gulfs, or bays penetrate far into the interior. An immense barren plain rising gradually to low coast mountain ranges.

454. Describe the lakes and rivers of Australia. What is the largest river?

Ans. The rivers are short, and nearly all the lakes are salt. Nearly all the rivers disappear in the dry season, and the lakes become marshes. The Murray river is the largest and is about 1,000 miles long.

455. Name the larger islands included in Oceanica.

Ans. Sumatra, Java, Borneo, Australia, New Zealand, Philippines, New Guinea.

456. In what zones does Oceanica lie?

Ans. Torrid and south temperate zones.

547. Name the three divisions of Oceanica.

Ans. Malaysia, Australasia and Polynesia.

458. What are the chief products of Malaysia?

Ans. Rice, coffee, cotton, sugar and indigo.

459. Name the two most important cities of Malaysia?

Ans. Batavia and Manila.

New York State.

460. Give an account of the salt industry in New York State. Name *two* other States that produce salt extensively.

Ans. The counties of Livingston and Wyoming together with the Finger Lake region of New York comprise the great salt producing section of the United States. The salt lies in beds forty to seventy feet thick and at a varying depth. Water is pumped into the salt bed by means of a hole drilled down to the bed. The dissolved salt, or brine, is pumped up and evaporated by the sun or by artificial heat. In western New York some salt is mined like coal. Kansas and Texas extensively produce salt.

461. Name *two* railroads that connect New York city with Buffalo. Describe the route of *one* of these railroads and name *two cities* and *three* villages located on it.

Ans New York Central & Hudson River railroad; Delaware, Lackawanna & Western railroad. The N. Y. C. & H. R. R. runs north along the east bank of the Hudson river to Albany, where it crosses the Hudson and runs westward through the Mohawk valley and the central plateau to Buffalo. Two cities: Utica, Poughkeepsie. Three villages: Peekskill, Herkimer, Lyons.

462 Name a river of the State of New York flowing into a) Lake Champlain; b) the Ohio; c) the St. Lawrence; d) Lake Ontario; e) Chesapeake bay.

Ans. a) Au Sable; b) Allegany; c) Oswegatchie; d) Genesee; e) Susquehanna.

463. a) What counties and part of a county are included within the boundaries of New York city? b) Name the boroughs into which the city is divided. c) What is the population of New York city?

Ans. a) New York, Kings, Queens, Richmond counties and part of the county of Westchester. b) Manhattan, The Bronx, Brooklyn, Queens and Richmond. c) 3,437,202.

464. What waters surround a) Manhattan Island, b) Long Island?

Ans. a) Hudson river, New York bay, East river, Harlem river. b) East river, Long Island sound and Atlantic ocean.

465. What State institution is located at a) Auburn; b) Batavia; c) Ogdensburg; d) Elmira, e) Plattsburg? Answer any four.

Ans. a) State prison; b) institution for the blind; c) insane asylum; d) reformatory; e) normal school.

466. For what is each of the following cities noted: Cohoes, Ithaca, Buffalo, Gloversville?

Ans. Cohoes is noted as a manufacturing city, and the principal articles of manufacture are cotton and knit goods. Ithaca is the seat of Cornell University. Buffalo is a thriving commercial city, and is engaged extensively in manufacturing. It is an important railroad center, a lake port, and the terminus of the Erie canal. Gloversville is noted for the manufacture of gloves.

467. On what water is each of the following cities located: a) Oswego; b) Jamestown; c) Poughkeepsie; d) Ithaca; e) Plattsburg?

Ans. a) Lake Ontario, Oswego river; b) Chautauqua outlet; c) Hudson river; d) Cayuga lake; e) Lake Champlain.

468. Name the counties of New York which border on a) Lake Erie; b) Lake Ontario; c) Lake Champlain.

Ans. a) Chautauqua, Erie; b) Niagara, Orleans, Monroe, Wayne, Cayuga, Oswego, Jefferson; c) Clinton, Essex, Washington.

469. Name the counties of New York that border on a) Pennsylvania; b) New Jersey.

Ans. a) Chautauqua, Cattaraugus, Allegany, Steuben, Chemung, Tioga, Broome, Delaware, Sullivan, Orange. b) Orange, Rockland, Westchester, New York, Kings, Richmond.

470. Describe a railway route between New York and Buffalo. Mention in order *five* cities and *three* rivers on this route.

Ans. A railroad route from New York to Buffalo should be on the Hudson river to Albany and from Albany to Buffalo on the New York Central. Cities

through which this railroad would pass are, Yonkers, Poughkeepsie, Hudson, Albany and Syracuse. Three rivers are, Hudson, Mohawk and Genesee.

471. Trace the course of the waters of *each* of the following to the sea: Chautauqua lake, Otsego lake, Lake George.

The waters of Lake Chautauqua reach the sea by the Alleghany river, Ohio river, Mississippi river, Gulf of Mexico and Florida strait.

The waters of Lake Otsego reach the sea by the Susquehanna river, Chesapeake bay and Hampton Roads.

The waters of Lake George reach the sea by Lake Champlain, Sorel river, St. Lawrence river, Gulf of St. Lawrence and the Strait of Belle Isle.

472. Give the location of *each* of the following cities and state *one* noteworthy fact regarding each: Poughkeepsie, Gloversville, Oswego, Elmira, Troy.

Ans. Poughkeepsie, eastern New York on Hudson river; seat of Vassar College, a famous school for girls. Gloversville, northern New York at the foot hills of the Adirondacks; noted for the manufacture of gloves. Oswego, northwestern New York on Lake Ontario; port of entry, head of Oswego canal. Elmira, south-central New York; reform school for boys. Troy, eastern part on Hudson river; collars, cuffs and shirts.

473. Give approximately the distance from *a*) Buffalo to Albany; *b*) Albany to New York city. Name five cities on the *c*) Erie canal; *d*) Hudson river.

Ans. *a*) 300 miles; *b*) 150 miles; *c*) Albany, Cohoes, Schenectady, Amsterdam, Little Falls, Utica, Rome, Syracuse, Rochester, Lockport, North Tonawanda, Buffalo; *d*) New York, Yonkers, Newburgh, Poughkeepsie, Kingston, Hudson, Albany, Rensselaer, Watervliet, Troy.

474. State the causes of the rapid growth of Buffalo from a small village in 1825 to a city of 352,387 population in 1900.

Ans. As a lake port and the western terminus of the Erie canal, its commercial advantages were great; later it became an important railroad center; and more recently its nearness to Niagara Falls has made it an important manufacturing place because of electric power.

475. a) Name four cities at, or near, the head of navigation on the Hudson river. b) Name a special manufacturing interest in each of two of these cities.

Ans. a) Albany, Cohoes, Troy, Watervliet, Rensselaer. b) Troy, collars and cuffs; Watervliet, guns at the United States arsenal; Albany, beer, stoves, car-heating apparatus, etc.; Cohoes, hosiery and knit goods; Rensselaer, felt goods.

476. Name and give the location of two counties of this State that produce for commerce a) iron; b) salt; c) petroleum.

Ans. a) Clinton, Essex, northeastern part. b) Onondaga, central; Livingston, western. c) Allegany, Cattaraugus, southwestern.

477. Give the name and the location in New York State of *two* lowland regions, *two* highland regions and *one* mountain peak.

Ans. Lowland regions. Southwestern part, Hudson valley. Central part, Mohawk valley. Highland regions: Northern part, Adirondack highland. Eastern part, Catskill highland. Mountain peak: Mount Marcy in Adirondack highland in northeastern part.

478. Mention an important fact connected with *each* of the following places in New York State: Schenectady, Geneva, Utica, Potsdam.

Ans. Schenectady, largest electrical manufacturing plant in the world. Geneva, seat of Hobart College. Utica, State Hospital for Insane. Potsdam, State Normal School.

479. Give the location in New York State of a) a granite quarry, b) a limestone quarry, c) an iron mine, d) a sugar factory, e) a salt factory.

Ans. a) Clinton county, b) St. Lawrence county, c) Essex county, d) Rome and Binghamton, e) Syracuse.

480 Draw an outline map of the State of New York showing location and names of three important railroads.

Ans. The New York Central & Hudson River R. R., the Erie R. R., the Delaware & Hudson R. R.

481. Using the outline map asked for in No. 480, locate and name *a*) five rivers; *b*) five lakes; *c*) five principal cities; *d*) five State institutions.

Ans. *a*) Hudson, Mohawk, Genesee, Oswego, Black; *b*) Lakes George, Chautauqua, Seneca, Cayuga, Oneida; *c*) New York, Buffalo, Rochester, Albany, Syracuse; *d*) Batavia, State School for the Blind; Elmira, State Reformatory; Utica, State Hospital for the Insane; Sing Sing, State Prison; Plattsburg, Normal School.

482. Name *a*) three of the lakes of central New York; *b*) three cities or villages located upon these lakes.

Ans. *a*) and *b*) Cayuga, Ithaca; Owasco, Auburn; Onondaga, Syracuse.

483. Name a city of this State that is noted for the manufacture of *a*) farming machinery, *b*) electric appliances, *c*) cuffs, *d*) knit goods, *e*) gloves.

Ans. *a*) Auburn, Batavia, etc., *b*) Schenectady, *c*) Troy, *d*) Cohoes, Utica, etc., *e*) Gloversville, Johnstown.

484. To what river system does the outlet of each of the following lakes belong: *a*) Chautauqua; *b*) Oneida; *c*) Otsego; *d*) Champlain?

Ans. *a*) Ohio; *b*) St. Lawrence; *c*) Susquehanna; *d*) St. Lawrence.

485. Name and locate a city of the State of New York noted *a*) for the manufacture of locomotives; *b*) as an important lumber market; *c*) as a center of the great nursery industry; *d*) for the manufacture of knit goods; *e*) for the manufacture of boots and shoes.

Ans. *a*) Schenectady, eastern part. *b*) North Tonawanda, western part on Erie canal. *c*) Geneva, western part on Seneca lake. *d*) Cohoes, eastern part on Hudson. *e*) Rochester, western part on Genesee river.

486. Describe (giving source, course, and the body of water to which it is tributary) the Mohawk river, and mention an important historical event associated with it.

Ans. *a*) Rises in northern central New York, flows southeast into Hudson. *b*) Burning of Schenectady, 1690.

487. Mention a section of New York State that is a) mountainous, b) comparatively level, c) noted for fruit raising, d) noted for production of petroleum, e) noted for producing iron ore.

Ans. a) The Adirondack region; b) Long Island; c) the Hudson valley; d) southwestern part; e) the Adirondack region.

488. Mention *one* county of New York well known for its production of fruit, *one* in which wheat growing is an important industry, *one* in which lumbering is carried on extensively, *one* in which iron is mined, *one* in which dairying is an important industry.

Ans. Schuyler county is noted for its production of fruit; wheat growing is an important industry in Monroe county; lumbering is carried on extensively in Franklin county; iron is mined in Essex county; dairying is an important industry in Jefferson county.

489. Mention the largest *five* cities in New York State and give *one* important fact concerning each city mentioned.

Ans. New York city is noted for being the metropolis of America; Buffalo is a grain port; Rochester is noted for its flour mills; Albany is the capital of New York State; Syracuse is noted for its salt wells.

490. Mention *five* of the native wild animals of New York State and describe *one* of them, touching on a) its home, b) its food, c) its habits of life, d) its benefits or injuries to man.

Ans. Deer, bear, panther, fox and skunk. The fox lives in almost any part of the State. It kills hens, ducks, geese and mice, and also eats rabbits. The fox is noted for his slyness and is killed for sport and for his hide, which can be sold. It digs a hole in the ground, but does not sleep all through winter like the woodchuck. It kills the farmer's hens and will eat all that is left out of doors. It benefits the farmers by killing the mice and grubs that destroy the crops.

491. Name the several boroughs constituting Greater New York. Give *two* reasons why New York has become the metropolis of the western hemisphere.

Ans. Bronx, Brooklyn, Manhattan, Queens, Richmond. Its excellent harbor and the advantages of its location at the mouth of the Hudson river system, which gives easy communication with a fertile country in the interior of the State and with the middle West.

492. Mention *three* counties of New York State that are comparatively level, *three* that are mountainous, *three* in which natural gas is found, *one* whose waters flow into the Mississippi.

Ans. The three counties of New York State whose surface is level are Orleans, Erie and Niagara counties. The three that are mountainous are Essex, Ulster and Dutchess counties. The three in which natural gas is found are Ontario, Erie and Oswego counties. The one whose waters flow into the Mississippi is Chautauqua county.

493. State approximately *a*) the distance from Buffalo to Rochester, *b*) the distance from Albany to New York city, *c*) the area of New York State, *d*) the population of New York State.

Ans. *a*) Eighty-five miles. *b*) One hundred and sixty miles. *c*) 49,170 square miles. *d*) 7,500,000.

494. Give the location and mention *one* leading manufactured product of *each* of the following cities of New York State: Syracuse, Jamestown, Troy, Binghamton, Yonkers.

Ans. Syracuse is near the central part of the State. A manufactured product is salt. Jamestown is in the southwestern part of the State. A leading manufactured article is furniture. Troy is in the eastern part of the State on the Hudson river. It is noted for the manufacture of shirts, collars and cuffs. Binghamton is in the southern part of the State on the Susquehanna river. It is noted for boots and shoes. Yonkers is in the southeastern part of the State. It is noted for carpets.

495. Give the location of *a*) Sandy Hook, *b*) Montauk Point, *c*) Grand Island, *d*) the Palisades

Ans. *a*) The northeastern extremity of New Jersey, at the entrance to New York bay. *b*) At the eastern extremity of Long Island. *c*) In the Niagara river,

western part of New York. *d*) On the west bank of the lower Hudson.

496. Name three cities of this State whose location may be accounted for from physical conditions and state such conditions in each case.

Ans. New York, on account of its fine harbor and the Hudson river; Buffalo, on account of its location on Lake Erie and the terminus of the Erie canal; Albany, on account of its location on the Hudson river and the terminus of the Erie canal.

497. Beginning on the west, mention in order the bodies of water through which the northern boundary of the State of New York passes.

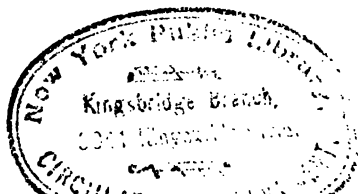
Ans. Lake Erie, Lake Ontario, St. Lawrence river, Lake Champlain.

498. State *five* forms of mineral wealth found in New York State and mention a locality where each is found.

Ans. Salt, found in Wyoming county; petroleum, found in Allegany county; marble, found in Warren county; iron, found in Essex county; sandstone, found in St. Lawrence county.

499. Mention *two* important canals in New York State. State where each canal starts and ends. Why are canals of value?

Ans. Erie canal starts at Albany and ends at Buffalo. Syracuse and Oswego canal starts at Syracuse and ends at Oswego. Canals are of value because they shorten routes and also connect cities which otherwise would have no water route to the ocean and lake ports; hence, they help commerce and cheapen the cost of transportation.



ARITHMETIC.

A. Fundamental Rules, Least Common Multiple and Greatest Common Divisor.

1. The total number of votes cast for two candidates at an election was 10564. One of the candidates received 428 votes more than the other; how many votes did each candidate receive?

Ans. $(10564 - 428) \div 2 = 5068$ votes for one.
 $5068 + 428 = 5496$ votes for the other.

2. Find by the longer process of successive subtractions, how many times 3041 is contained in 15234.

Ans. 5 times; 29 remainder.

3. Write 1001101 in Roman numerals.

Ans. $\overline{\text{MMCI}}$.

4. Combine with the proper sign those prime factors of 1176 and 256 which produce (a) their least common multiple; (b) their greatest common divisor.

Ans. (a) $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 \times 7 \times 3 = 37632$, L. C. M. (b) $2 \times 2 \times 2 = 8$, G. C. D.

5. Divide, using cancellation, $36 \times 77 \times 13 \times 39 \div 45 \times 21 \times 26 \times 7 \div 30$.

$$\text{Ans. } \frac{36 \times 77 \times 13 \times \cancel{39} \times 30}{45 \times 21 \times 26 \times 7 \times \cancel{140}} = \frac{429}{245} = 1 \frac{134}{245}$$

6. A number is divided by 44 using first the factor 11 with a remainder of 9, then the factor 4 with a remainder of 3; the quotient being 139. Find the number.

Ans. $139 \times 4 + 3 = 559$; $559 \times 11 + 9 = 6158$.

7. Find the least common multiple of 153, 204 and 510.

Ans. $17 \times 3 \times 2 \times 3 \times 2 \times 5 = 3060$ L. C. M.

8. Divide, in the ordinary manner, 15234 by 3041.

Ans.
$$\begin{array}{r} 39 \\ 5 \overline{) 3041} \end{array}$$

9. Divide \$341 among four men so that B shall have twice as much as A, C. shall have as much as A and B, and D shall have as much as B and C.

Ans. Let 1 represent A's share; 2 B's share; 3 C's share; 5 D's, $\$341 \div 11 = \$31 =$ Ratio of real amount to representative number. $\$31 \times 1 = \31 A; $\$31 \times 2 = \62 B; $\$31 \times 3 = \93 C; $\$31 \times 5 = \155 D.

10. A had \$3,958, B had \$1,496; A lost \$1,365; B gained \$1,165; then which had the more and how much?

Ans. $\$3,958 - \$1,365 = \$2,593$. $\$1,496 + \$1,165 = \$2,661$. $\$2,661 - \$2,593 = \$68$ B.

11. Express in figures as a single number, forty-two million, five hundred sixty-seven thousand, eighty-one.

Ans. 42,567,081.

12. What is the value of $(12 + 6) + 16 \times 2 - (63 - 19 + 4) + 45 \div 9 - 3$?

Ans. $18 + 32 - 40 + 5 - 3 = 12$

13. How many days will be required for 6 men to build 7 machines, if 12 men build 40 machines in 9 days?

Ans.
$$\frac{9 \times 12 \times 7}{40 \times 6} = \frac{63}{20} = 3 \frac{3}{20} \text{ days.}$$

14. Find the quotient of the least common multiple of all the even digits by their greatest common divisor.

Ans. Even digits 2, 4, 6, 8. $2 \times 2 \times 2 \times 3 \times 2 = 24$ L. C. M. 2, G. C. D. $24 \div 2 = 12$.

15. Find the value of $(4 + 3 \times 7 + 10 \div 2) \times 6 + 4$.

Ans. $4 + 21 + 5 = 30$. $30 \times 2 = 60$.

16. A peddler bought 491 yards of cloth at 81 cents a yard; he spoiled 29 yards, and sold the rest at 95 cents a yard; did he gain or lose and how much?

Ans. $491 \times 81 = \$397.71$; $(491 - 29) \times 95 = \$438.90$. $\$438.90 - \$397.71 = \$41.19$.

17. Four commercial travelers leave the home office on Thursday, January 2, 1902, on circuits of 4, 8, 12 and 16 weeks' travel respectively. If they continue traveling every week repeating their circuits, on what date will all first meet again at the office?

Ans. L. C. M. of 4, 8, 12, 16 = 48. 48 weeks from Jan. 2, 1902 = Dec. 4, 1902.

18. $364 + 28 \times 7 - (210 - 84 \div 7) - 18 \div 3 = ?$

Ans. $364 + 196 - (210 - 14) - 6 = ?$ $364 + 196 - 196 - 6 = 358$.

19. The divisor is 25 and the quotient is 1,050; if the divisor is multiplied by 7, what will be the quotient?

Ans. $1050 \div 7 = 150$.

20. At a certain election there were 327,140 votes cast for three candidates; the successful candidate received a majority of 28 over the other two whose votes were in the ratio of 3 to 1. How many votes were cast for each candidate?

Ans. $327140 + 28) \div 2 = 163584$ First C. $(163584 - 28) \div 4 = 40889$ Third C. $(163584 - 28) - 40889 = 122667$ Second C.

21. If a man earns \$25 while a boy earns \$15, how many dollars can the man earn while the boy is earning \$120?

Ans. $\$120 \div 15 = 8$; $8 \times 25 = \$200$.

22. Express in words 3008039.

Ans. Three million eight thousand thirty-nine.

23. $18 + 3 \times 15 - 4 \div \frac{2}{3} \text{ of } \frac{1}{2} = ?$

Ans. $18 + 45 - 4 \div \frac{1}{3} = ?$ $18 + 45 - 32 = 31$.

24. What greatest uniform length of logs could be cut from trunks of trees measuring severally 81, 63, 45 and 27 ft. long?

Ans. G. C. D. = 9.

25. The product is 1,123,482 and the multiplier is 246; what is the multiplicand?

Ans. $1,123,482 \div 246 = 4,567$.

26. Express in figures the following number: twenty trillion seventy million nine thousand fourteen.

Ans. 20,000,070,009,014.

27. There are three farms of 42, 72 and 54 acres respectively. If they are divided into equal lots of the largest possible size, what will be the number of lots and the size of each lot?

Ans. $2 \times 3 = 6$ G. C. D. $(42 + 72 + 54) \div 6 = 28$ lots. 28 lots of 6 acres each.

28. If 6014 pounds of meat must last 62 days, how many pounds can be used each day?

Ans. $6014 \div 62 = 97$ lbs.

29. A basket is placed on the ground in a line with 20 potatoes which are 2 feet apart; the basket is 2 feet from the first potato. How far must a boy run to bring the potatoes, one by one, to the basket, if he starts from the basket?

Ans. $20 \times 2 \times 2 = 42$; $42 \times 20 = 840$ feet.

30. If eight loads of coal weigh respectively 4699, 5477, 3963, 3994, 4769, 5047, 4925 and 5302 lbs., what is the average weight per load?

Ans. Adding the eight loads and dividing the total by 8 gives 4747 lbs., the average weight per load.

31. Write in words, $705,800^{\frac{13}{10}}$; write in figures, eight million eighty-three and nine one-hundredths.

Ans. Seven hundred five thousand eight hundred and thirteen-nineteenths.
8,000,083.09.

32. If in five days a clerk can copy 125 pages of 36 lines each, 11 words to the line, how many pages of 30 lines each and 12 words to the line can he copy in six days?

$$\text{Ans. } \frac{125 \times 36 \times 11 \times 6}{5 \times 30 \times 12} = 165 \text{ pages.}$$

33. A boy bought 150 oranges at the rate of 5 for 6 cents, and sold them at the rate of 3 for 5 cents, how much did he gain?

$$\text{Ans. } 150 \div 5 = 30; 30 \times 6 = 1.80. \quad 150 \div 3 = 50; 50 \times 5 = 2.50. \quad \$2.50 - \$1.80 = \$0.70 \text{ gain.}$$

34. There are 60 pounds in a bushel of wheat and 48 pounds in a bushel of barley. How many bushels of barley will weigh as much as 680 bushels of wheat?

$$\text{Ans. } 680 \times 60 \div 48 = 850 \text{ bu of barley.}$$

35. If a bushel of wheat makes 42 pounds of flour how many barrels of flour of 196 pounds each, can be made from 6,174 bushels of wheat?

$$\text{Ans. } 6174 \times 42 = 259308. \quad 259308 \div 196 = 1325 \text{ barrels.}$$

36. If a train travels at the rate of 54 miles an hour, how long will it take to go from Albany to New York a distance of 150 miles?

$$\text{Ans. } 150 \div 54 = 2\frac{7}{9} \text{ hours.}$$

37. If it requires 7,020,000 bricks to build a factory how many teams will it require to draw the bricks in 60 days, if each team draws 5 loads per day and 600 bricks at a load?

$$\text{Ans. } \frac{7020000}{5 \times 60 \times 600} = 39 \text{ teams.}$$

38. The president of the United States receives a yearly salary of \$50,000. How much is that a day?

$$\text{Ans. } 50,000 \div 365 = \$136\frac{7}{13}.$$

39. Add the following numbers: 3,465, 147,286, 573, 69,375, 227,843, 84,895 and 83,671. Subtract their sum from 901,109.

Ans. Sum = 617,108. $901109 - 617,108 = 284,001$.

40. From ten million, one thousand, ten take nine million, five hundred three thousand, nine hundred ninety-nine.

Ans. $10,001,010 - 9,503,999 = 497,011$.

41. Divide the least common multiple of 812 and 336 by their greatest common divisor.

Ans. $(4 \times 7 \times 29 \times 12) \div (4 \times 7) = 348$.

42. Find the prime factors of 1395 and 1736, after first finding by division their greatest common divisor.

Ans. $31 = \text{G. C. D.}$ $1395 = 31 \times 5 \times 3 \times 3$.
 $1736 = 31 \times 7 \times 2 \times 2 \times 2$.

B. Fractions.

43. A prize of \$60 was divided between two persons in the ratio of $\frac{2}{3}$ to $\frac{5}{6}$; how much was each one's share?

Ans. $\frac{2}{3} : \frac{5}{6} = \frac{4}{6} : \frac{5}{6} = 4 : 5$. $4 + 5 = 9$ parts = \$60. 1 part = $\$60 \div 9 = 6\frac{2}{3}$. $6\frac{2}{3} \times 4 = 26\frac{2}{3}$; $6\frac{2}{3} \times 5 = 33\frac{1}{3}$.

44. If $\frac{2}{3}$ of a ship cost \$42,000 what will $\frac{1}{10}$ of the ship cost? (Solve by proportion).

Ans. $\frac{1}{10} \times 42000 \div \frac{2}{3} = \9750 .

45. If 4 first-class workmen can paint a certain church in 18 days and it takes 3 second-class workmen 32 days to do the same, how many days will it take the 7 working together to paint the church?

Ans. In one day 4 workmen do $\frac{1}{18}$. In one day 3 workmen do $\frac{1}{32}$. $\frac{1}{18} + \frac{1}{32} = \frac{16}{288} + \frac{9}{288} = \frac{25}{288}$ in one day. The whole work or 1 $\div \frac{25}{288} = 11\frac{18}{25}$.

46. Simplify the following: $\frac{1\frac{1}{2} + 2\frac{3}{5} \quad \frac{3}{4} \times 1\frac{2}{3}}{4\frac{1}{10} - 2\frac{4}{5} \quad 1\frac{1}{4}} \times$

$6\frac{1}{2}$.

Ans. $\frac{11}{13} \times 1 \times \frac{13}{2} = \frac{11}{2} = 20\frac{1}{2}$.

47. A can do a certain piece of work in 14 days, and A and B together can do the same work in 8 days. How many days ought it to take B alone to do the work?

Ans. A can do $\frac{1}{14}$ in 1 day; A and B can do $\frac{1}{8}$ in 1 day; B can do in 1 day $\frac{1}{8} - \frac{1}{14} = \frac{3}{56}$. $1 \div \frac{3}{56} = 18\frac{2}{3}$.

48. $\frac{3}{4}$ of $\frac{1}{2}$ of 90 is $\frac{5}{7}$ of three times what number?

Ans. $\frac{3}{4}$ of $\frac{1}{2}$ of 90 = $\frac{135}{4}$; $\frac{135}{4} = \frac{5}{7} \times 3 ? \frac{135}{4} = \frac{5}{7} ? \frac{135}{4 \times 15} = \frac{1}{7}$; $\frac{135}{4} = \frac{7}{7}$; $15\frac{3}{4}$ equals number.

49. Divide 440 into three parts that shall be in the ratio of 3, $3\frac{1}{3}$, and 7.

Ans. $3 = \frac{9}{3}$; $3\frac{1}{3} = \frac{10}{3}$; $7 = \frac{21}{3}$. $\frac{9}{3} + \frac{10}{3} + \frac{21}{3} = 40$. $440 \div 40 = 11$ one part. $11 \times 9 = 99$; $11 \times 10 = 110$; $11 \times 21 = 231$.

50. What number added to $81\frac{17}{18}$ will make $121\frac{5}{12}$?

Ans. $121\frac{5}{12} - 81\frac{17}{18} = 39\frac{17}{36}$.

51. A man at his death was the owner of an undivided $\frac{3}{16}$ interest in a silver mine, and by will left $\frac{2}{5}$ of his interest to one son, $\frac{3}{10}$ to another, and the remainder to the four children of a deceased daughter, to be divided equally among them. What interest in the mine fell to each legatee?

Ans. $\frac{2}{5}$ of $\frac{3}{16} = \frac{3}{40}$ left to first son; $\frac{3}{10}$ of $\frac{3}{16} = \frac{9}{160}$ left to second son; $\frac{3}{40} + \frac{9}{160} = \frac{21}{160}$; $\frac{3}{16} - \frac{21}{160} = \frac{9}{160}$; $\frac{1}{4}$ of $\frac{9}{160} = \frac{9}{640}$ to each grandchild.

52. A rain barrel can be filled by a pipe in $3\frac{1}{2}$ hours and can be emptied by another pipe in 5 hours; if the barrel is empty and both pipes are open, how long will it take to fill the barrel? [Assume that the flow in the pipes is constant.]

Ans. In 1 hour $\frac{1}{3\frac{1}{2}}$ of bbl. is filled. In 1 hour $\frac{1}{5}$ of bbl. is emptied, $\frac{1}{3\frac{1}{2}} = \frac{2}{7}$; $\frac{2}{7} - \frac{1}{5} = \frac{2}{35}$. $\frac{2}{35}$, part filled in 1 hour. $35 \div 3 = 11\frac{2}{3}$ hours.

$$5\frac{1}{2} - 3\frac{3}{4}$$

53. Simplify $\frac{2}{5} + \frac{15}{3\frac{1}{2} + 2\frac{3}{4}}$

Ans. $\frac{1}{4} \div \frac{11}{5} = \frac{5}{44} = \frac{5}{8}$.

54. If $\frac{3}{4}$ of a bushel of potatoes are worth $\frac{1}{10}$ of a barrel of apples or are worth 30c in money, what are $5\frac{3}{4}$ barrels of apples worth in potatoes and in money?

Ans. $\frac{1}{10}$ bbl. = $\frac{3}{4}$ bu. $\frac{1}{10}$ bbl. = $\frac{1}{4}$ bu. 1 bbl. = $2\frac{1}{2}$ bu. $2\frac{1}{2} \times 5\frac{3}{4} = 14\frac{3}{8}$ bu. $\frac{3}{4}$ bu. cost \$0.30. $\frac{1}{4}$ bu. cost \$0.10. 1 bu. cost \$0.40. $14\frac{3}{8}$ bu. $\times .40 = \$5.75$.

55. Reduce $\frac{187}{247}$ to its lowest terms.

Ans. $\frac{187}{247}$

56. Multiply $2\frac{1}{4}$ by $7\frac{1}{2}$.

Ans. $20\frac{31}{32}$

57. Add $\frac{2}{3}$, $\frac{3}{4}$ and $\frac{5}{6}$.

Ans. $\frac{2}{3} + \frac{3}{4} + \frac{5}{6} = \frac{8 + 9 + 10}{12} = \frac{27}{12} = 2\frac{1}{4}$.

58. A can do a piece of work in $7\frac{1}{2}$ days, B can do the same in $8\frac{1}{4}$ days and C in $8\frac{1}{3}$ days. How long will it take all three to do the work?

Ans. $\frac{1}{7\frac{1}{2}} + \frac{1}{8\frac{1}{4}} + \frac{1}{8\frac{1}{3}} = \frac{309}{825} = A, B \text{ and } C$ together in one day. $825 \div 309 = 2\frac{5}{103}$ days.

59. If $\frac{2}{5}$ of a man's property is real estate, $\frac{2}{10}$ of it mortgages, $\frac{1}{6}$ of it notes, and the remainder, \$1,200, cash, what is the value of his entire property?

Ans. $\frac{2}{5} + \frac{2}{10} + \frac{1}{6} = \frac{20}{30} + \frac{20}{30} + \frac{5}{30} = \frac{45}{30} = \frac{3}{2}$
 $\$1,200; \frac{2}{30} = \$300; \frac{20}{30} = \$9,000.$

60. Simplify $\frac{2\frac{1}{6} + 2\frac{5}{8} \div \frac{9}{14}}{3 \times 1\frac{3}{4}} - \frac{1}{6} \times 6\frac{1}{7}.$

Ans. $\frac{20}{4} \div \frac{21}{4} = \frac{20}{21} - \frac{6}{21} = \frac{1}{3}.$

61. Reduce $\frac{\frac{3}{4} + 2}{\frac{2}{5} - \frac{1}{5}}$ to simplest form.

Ans. $\frac{11}{4} \div \frac{1}{5} = 15\frac{15}{20}.$

62. I bought a barrel of sugar containing 220 lbs. at $8\frac{1}{2}$ cents a pound. While selling, it dried away $\frac{1}{10}$. How much did I gain or lose by selling it at $9\frac{1}{4}$ cents a pound?

Ans. $220 \times .08\frac{1}{2} = \$18.70; 220 - (\frac{1}{10} \text{ of } 220) = 198; 198 \times .09\frac{1}{4} = \$18.31\frac{1}{2}; \$18.70 - \$18.31\frac{1}{2} = \$0.37\frac{1}{2} \text{ loss.}$

63. A firm had $\frac{1}{4}$ of its capital invested in goods, $\frac{2}{3}$ of the remainder in land and the balance, \$1,224, in cash. What was the capital of the firm?

Ans. $\frac{1}{4} = \text{goods. } \frac{2}{3} \text{ of } \frac{3}{4} = \frac{1}{2} = \text{land. } \frac{1}{4} = \text{cash} = \$1224; \frac{1}{4} = \$1224 \times 4 = \$4896.$

64. If three boxes of oranges cost $\$5\frac{1}{3}$, how many boxes can be bought for \$17?

Ans. $5\frac{1}{3} \div 3 = \text{cost of one box. } \frac{17}{3} \times \frac{1}{3} = \frac{17}{9} = \text{cost of one box. } \$17 \div \frac{17}{9} = \text{No. boxes. } 17 \times \frac{9}{17} = 9 \text{ boxes.}$

65. A field containing $4\frac{5}{8}$ acres produced $33\frac{1}{3}$ bushels of wheat per acre. What was the total yield?

Ans. $33\frac{1}{3} \text{ bu.} \times 4\frac{5}{8} = \frac{100}{2} \times \frac{17}{4} = \frac{850}{4} = 154\frac{1}{2} \text{ bu.}$

66. Find the total cost of $36\frac{1}{2}$ pounds of tea at 94c. a pound, 63 gallons of molasses at 37c. a gallon,

125 pounds of rice at 8c. a pound and 56 bars of soap at $6\frac{1}{4}$ c. a bar.

Ans. \$71.12.

67. The inmates of six cottages used during the year $12\frac{1}{2}$, $14\frac{2}{3}$, $10\frac{1}{4}$, 11, $12\frac{3}{4}$ and $15\frac{1}{3}$ barrels of flour respectively. Find the average number of barrels per cottage.

Ans. $12\frac{3}{4}$.

68. A man owning 725 acres of land sold at different times, $165\frac{1}{2}$ acres, $216\frac{3}{4}$ acres, and $75\frac{1}{8}$ acres. How many acres did he have left?

Ans. $725 - (165\frac{1}{2} + 216\frac{3}{4} + 75\frac{1}{8}) = 267\frac{5}{8}$.

69. A farm consists of four fields containing respectively $42\frac{3}{4}$, $16\frac{1}{2}$, $31\frac{3}{8}$ and $36\frac{2}{3}$ acres. How many acres are there in the farm?

Ans. $127\frac{23}{24}$.

70. Find the total cost of 5 pieces of cheesecloth each containing $9\frac{1}{2}$ yards at 4c. a yard, 9 dozen buttons at 7c. a dozen and $1\frac{1}{2}$ dozen handkerchiefs at 16c. a piece.

Ans. \$5.41.

71. A and B together own 740 acres of land. A owns $329\frac{3}{4}$ acres. How many does B own?

Ans. $410\frac{1}{4}$ acres.

72. Divide \$28,217 between two men, giving one $\frac{2}{5}$ of what the other receives.

Ans. $\frac{2}{5} + \frac{2}{5} = \frac{4}{5} = \28217 ; $\frac{1}{5} = \frac{1}{4}$ of \$28217 = \$4031; $\frac{2}{5} = \$20155$; $\frac{2}{5} = \$8062$.

73. Find the cost of $24\frac{1}{2}$ yards of carpet at $66\frac{2}{3}$ cents a yard.

Ans. $\$0.66\frac{2}{3} \times 24\frac{1}{2} = \$16.33\frac{1}{3}$.

74. Add $3\frac{1}{4}$, $2\frac{3}{8}$, $5\frac{1}{8}$ and subtract the sum from 25. (Do not reduce to decimals.)

Ans. $25 - (3\frac{1}{4} + 2\frac{5}{8} + 5\frac{1}{8}) = 14\frac{1}{2}.$

75. If a man can cut $1\frac{1}{4}$ cords of wood in $\frac{1}{2}$ of a day, how long will it take him to cut 20 cords?

Ans. $20 \div (1\frac{1}{4} \div \frac{1}{2}) = 8 \text{ days}.$

76. From a piece of cloth containing 50 yards $12\frac{3}{4}$ yards are cut at one time and $7\frac{1}{8}$ yards at another. How many yards remain?

Ans. $50 - (12\frac{3}{4} + 7\frac{1}{8}) = 30\frac{1}{8}.$

77. From a piece of cloth containing 10 yards, $2\frac{1}{2}$ yards, $1\frac{1}{3}$ yards and $2\frac{1}{4}$ yards are cut, how much remains?

Ans. $10 - (2\frac{1}{2} + 1\frac{1}{3} + 2\frac{1}{4}) = 3\frac{11}{12}.$

78. If $\frac{5}{8}$ of $\frac{1}{9}$ of a \$25,000 estate is sold to one party and $\frac{2}{3}$ of $\frac{8}{11}$ of it to another, what is the value of the part remaining?

Ans. $\$25,000 \times [1 - (\frac{5}{8} \text{ of } \frac{1}{9}) + \frac{2}{3} \text{ of } \frac{8}{11}] = \$5934\frac{24}{99}.$

79 Two men, $31\frac{1}{2}$ miles apart, travel toward each other. When they meet it is found that one has traveled $7\frac{3}{4}$ miles more than the other. How far has each traveled?

Ans. $31\frac{1}{2} - 7\frac{3}{4} = 23\frac{3}{4}; 23\frac{3}{4} \div 2 = 11\frac{3}{8}; 31\frac{1}{2} - 11\frac{3}{8} = 19\frac{5}{8}.$

80. Simplify $(\frac{\frac{3}{4} - \frac{2}{3}}{\frac{7}{8} - \frac{3}{4}} + \frac{1}{6} + \frac{3}{8} \times \frac{1}{9}) \div 7.$

Ans. $\frac{2}{7}.$

81. A can do a piece of work in $3\frac{1}{2}$ days, B in 3 days and C in $2\frac{3}{4}$ days; find how many days it will take them to do it if they all work together.

Ans. $\frac{1}{3\frac{1}{2}} + \frac{1}{3} + \frac{1}{2\frac{3}{4}} = 1 \text{ day}.$

82. Simplify $\frac{2 - \frac{1}{6}}{2\frac{2}{3}} \div (2 - 1\frac{3}{5} + \frac{7}{10})$

$$\frac{3}{4} - \frac{1}{8} \div \frac{1}{2}$$

Ans. $1\frac{1}{4}$.

83. Reduce to fractions having the least common denominator the following: $\frac{5}{9}$, $\frac{17}{36}$, $\frac{22}{45}$, $\frac{13}{54}$.

Ans. L. C. D. = 1260.

84. If \$472 be divided among A, B, and C in the proportion of 5, $6\frac{2}{3}$, and 8, respectively, how much will each receive?

Ans.— $5 + 6\frac{2}{3} + 8 = \frac{59}{3}$. $\$472 \div \frac{59}{3} = \8 . $\$8 \times 15 = \120 A's share. $\$8 \times 20 = \160 B's share. $\$8 \times 24 = \192 C's share.

1624

85. Reduce to its lowest terms —

3074

Ans. $\frac{28}{53}$.

86. The distance from Boston to Albany is 200 miles, and $\frac{3}{5}$ of this distance lacks 2 miles of being $\frac{2}{5}$ of the distance from Albany to Niagara Falls? What is the distance from Boston to Niagara Falls?

Ans. $\frac{3}{5}$ of 200 = 120. $120 + 2 = 122 = \frac{2}{5}$ distance from Albany to Niagara. $61 = \frac{1}{5}$ distance from Albany to Niagara. $305 + 200 = 505$ miles.

87. If $\frac{3}{8}$ of an acre of land is worth \$148, how much is $\frac{15}{16}$ of an acre worth? (Solve by proportion.)

Ans. $\frac{15}{16} \times 148 \div \frac{3}{8} = \370 .

88. If the value of $\frac{1}{7}$ of $\frac{3}{8}$ of an estate is \$4,500, what is the value of $\frac{1}{14}$ of $\frac{1}{12}$ of it?

Ans. If $\frac{1}{7}$ of $\frac{3}{8} = \$4500$, then $\frac{3}{56} = \$4500$ and $\frac{1}{56} = \frac{1}{3}$ of \$4500 or \$1500. Then $\frac{56}{56}$ or whole estate equals 56 times \$1500 = \$84000. $\frac{1}{14}$ of $\frac{1}{12} = \frac{1}{168}$ of \$84,000 = \$500.

89. If A can do a piece of work in 6 days and B can do the same work in 8 days, how long will it take B to finish after they have worked together two days?

Ans. A can do in 1 day $\frac{1}{6}$. B can do in day $\frac{1}{8}$. Both can do in 1 day $\frac{7}{24}$. $2 \times \frac{7}{24} = \frac{7}{12}$ in 2 days. $\frac{12}{12} - \frac{7}{12} = \frac{5}{12}$ remaining. $\frac{5}{12} \div \frac{1}{8} = \frac{5}{12} \times 8 = 3\frac{1}{3}$.

90. Simplify $\frac{2\frac{1}{6} + 2\frac{5}{8} \div \frac{9}{14}}{3 \times 1\frac{3}{4}} - \frac{1}{6} \times 6\frac{1}{7}$.

Ans. $\frac{1}{6}$. Same as \$60

91. Two-thirds of 12 is $12\frac{1}{2}$ times $\frac{1}{23}$ of what number?

Ans. $\frac{3}{2}$ of 12 = 8 = $\frac{23}{2} \times \frac{1}{23} = \frac{1}{2}$ of the number. $\frac{2}{2} = 16$.

92. Simplify $\frac{\frac{2}{3} \times \frac{5}{12} \times 4\frac{3}{4}}{1\frac{1}{2} + 4\frac{5}{6}}$

Ans. $\frac{5}{24}$.

93. When potatoes sell at $\$1\frac{3}{8}$ a barrel, how many barrels can be bought for \$25?

Ans. $\$25 \div \$1\frac{3}{8} = 18\frac{2}{11}$.

94. A and B together have \$70; C has twice as much as B and A has three times as much as C. How much has each?

Ans. B = 1 part. C = 2 parts. A = 6 parts. $1 + 6 = 7$ parts = \$70. 1 part = $\$70 \div 7 = \10 B. 2 parts = \$20 C. 6 parts = \$60 A.

95. Reduce to its simplest form $\frac{2\frac{2}{3} + 4\frac{3}{4}}{3\frac{1}{2} - 2\frac{7}{8}}$

Ans. $13\frac{1}{11}$.

96. What number can be subtracted seventeen times from 57 and have $\frac{9}{10}$ remaining?

Ans. $(57 - \frac{9}{10}) \div 17 = 3\frac{3}{10}$.

97. A can do a piece of work in 11 days, and B can do the same work in 13 days. How long ought it to take them if working together?

Ans. $\frac{1}{11} + \frac{1}{13} = \frac{24}{143}$ amount in 1 day. $1 \div \frac{24}{143} = 5\frac{23}{24}$.

98. Simplify $\frac{2\frac{1}{3} - \frac{5}{9} \times (12\frac{3}{5} \div 11\frac{2}{3})}{4\frac{7}{9} - 8\frac{2}{3} \times \frac{1}{2} + 1\frac{1}{9}}$

Ans. $1\frac{1}{25}$.

99. A certain army lost in one battle $\frac{2}{20}$ of its men and in another battle $\frac{1}{6}$ of the remainder, after which there were 16405 men left; find the number of men in the original army.

Ans. $\frac{20}{20} - \frac{2}{20} = \frac{18}{20}$. $\frac{1}{6}$ of $\frac{18}{20} = \frac{17}{100}$. $\frac{17}{100} + \frac{15}{100} = \frac{32}{100}$. $\frac{32}{100} - \frac{32}{100} = \frac{68}{100} = 68\%$. $68\% = \frac{1}{100} = 241.25$. $241.25 \times 100 = \frac{100}{100} = 24125$.

100. If 24 men, each working 10 hours a day, do $\frac{2}{3}$ of a piece of work in 28 days, in how many days should 20 men, each working 8 hours a day, finish the work?

Ans. $28 \times 10 \times 24 \times \frac{2}{3} = 10080$ hours. $8 \times 20 = 160$. $10080 \div 160 = 63$ days.

101. Add $\frac{2}{7}$ of $(5\frac{1}{3} \div \frac{1}{8})$ to $\frac{1}{9}$ of $(4\frac{1}{3} - 2\frac{7}{9})$.

Ans. $13\frac{21}{567}$.

102. During a month of 21 school days, there were 14 girls and 11 boys in attendance; 3 girls were absent 1 day each, 4 boys $1\frac{1}{2}$ days each and 2 boys 2 days each. Find the average attendance of (a) the girls, (b) the boys, (c) the school.

Ans. $14 - 3 = 11$ girls 21 days; $21 \times 11 = 231$ total attendance of 11 girls; $(21 - 1) \times 3 = 60$ total att. of 3 girls; $(231 + 60) \div 21 = 13\frac{1}{7}$ av. att. of girls. $11 - 4 = 7$ boys 21 days; $21 \times 7 = 147$ total att. of 7 boys; $(21 - 1\frac{1}{2}) \times 4 = 78$ total att. of 4 boys; $(147 + 78) \div 21 = 10\frac{1}{21}$ av. att. of boys. $(231 + 147 + 78) \div 21 = 24\frac{3}{21}$ av. att. of school.

103. The numerator of a fraction is one and one-half times the denominator, and the sum of the numerator and denominator is 240. What is the value of the fraction?

Ans. $\frac{2}{2} =$ denominator. $\frac{3}{2} =$ numerator. $\frac{2}{2} + \frac{3}{2} = 240$; $\frac{1}{2} = \frac{1}{6} \times 240 = 48$; $\frac{2}{2} = 96$; $\frac{3}{2} = 144$.

104. Reduce the following fractions to a common denominator and arrange them in the order of their value, $\frac{2}{3}$, $\frac{9}{13}$, $\frac{11}{19}$.

Ans. $\frac{9}{13} = \frac{513}{741}$; $\frac{2}{3} = \frac{494}{741}$; $\frac{11}{19} = \frac{429}{741}$.

105. One man has a piece of work that he can complete in 15 days, and a second man who can do only one-half as much work per day as the first has a piece of work that he can complete in 21 days. If the men work together, in how many days should they complete both pieces of work?

Ans. First man does $\frac{2}{3}$. Second man does $\frac{1}{3}$. $15 \times \frac{2}{3} = 10$. $21 \times \frac{1}{3} = 14$; $10 + 14 = 24$ days.

106. Simplify
$$\frac{2 \times (\frac{3}{5} - \frac{9}{25} \div \frac{2}{7} - \frac{5}{12} \times \frac{1}{20})}{1 \div (9 - 2 \times 2)}$$

Ans. $\frac{3}{8}$.

107. Add $\frac{1}{8}$, $\frac{1}{7}$, $\frac{2}{3}$ and $\frac{5}{9}$.

Ans. $1\frac{7}{24}$.

108. $(\frac{2}{9} + \frac{6}{15}) \times \frac{1}{2} = \frac{5}{7} \div$ by what number?

Ans. $\frac{22}{93}$.

109.
$$\frac{226}{16} + \frac{3}{10} \times \frac{20}{18} - \frac{22}{3} \div 1 - \frac{1}{9} = ?$$

Ans.
$$\frac{226}{16} + \frac{1}{3} - \frac{33}{5} = \frac{1886}{240} = 7\frac{103}{120}$$

110. Multiply $45\frac{9}{11}$ by $6\frac{2}{31}$, and write the product in words.

Ans. $277 \frac{285}{341}$. Two hundred seventy-seven and two hundred ninety-five three hundred forty-firsts.

111. An estate of \$150,000 is divided among legatees as follows: $\frac{1}{4}$ to a son; $\frac{1}{8}$ to a daughter; $\frac{1}{4}$ to the five children of a deceased son; $\frac{1}{8}$ to the three children of a deceased daughter; and the remainder equally to three brothers and two sisters. How much should each legatee receive?

Ans. Son receives $\frac{1}{4}$ of \$150,000 = \$37,500. Daughter receives $\frac{1}{8}$ of \$150,000 = \$18,750. Each child of deceased son $\frac{1}{5}$ of $\frac{1}{4}$ or $\frac{1}{20}$ = \$7,500. Each child of deceased daughter $\frac{1}{3}$ of $\frac{1}{8}$ or $\frac{1}{24}$ = \$6,250. Each brother and sister $\frac{1}{5}$ of $\frac{1}{4}$ or $\frac{1}{20}$ = \$7,500.

112. Find the proceeds of a note for \$480 due August 10, 1900, and discounted at bank July 11, 1900, at 6% per annum.

Ans. Term of discount = 30 days; $\$480 \times .06 \times \frac{30}{360} = \2.40 ; $\$480 - \$2.40 = \$477.60$.

113. A man gave $\frac{1}{4}$ of his money to his wife, $\frac{1}{4}$ of the remainder to his son, and $\frac{1}{4}$ of what then remained to charity. How much had he left? ✓

Ans. $\frac{1}{4}$ = wife; $\frac{1}{4}$ of $\frac{3}{4}$ = $\frac{3}{16}$ sons; $\frac{1}{4}$ of $\frac{9}{16}$ = $\frac{9}{64}$ charity; $\frac{1}{4} + \frac{3}{16} + \frac{9}{64} = \frac{27}{64}$; $\frac{64}{64} - \frac{27}{64} = \frac{37}{64}$.

114. A man willed $\frac{2}{7}$ of his estate of \$19,140 to his son and $\frac{3}{8}$ of it to each of his two daughters, but as such division was impossible, the court directed that it be divided in proportion to the fractions specified in the will. How much was the share of each?

Ans. $\frac{2}{7}$, $\frac{3}{8}$, $\frac{3}{8} = \frac{24}{56}$, $\frac{21}{56}$, $\frac{21}{56}$. 24 = son's, 21 = daughters; $24 + 21 + 21 = 66$ parts; $\$19140 \div 66 = \290 one part; $\$290 \times 24 = \6960 son's; $\$290 \times 21 = \6090 each daughter's.

8649

115. Reduce — to its lowest terms.

9424

279

Ans. $\frac{279}{304}$.

116. $84 \div 6 \div 9 - (81 - 3 \div 13) + 42 - 12 \times 3\frac{1}{3} = ?$

$$\text{Ans. } 84 - 80 \frac{16}{12} + 42 - 40 = 5 \frac{35}{39}.$$

117. If $\frac{3}{4}$ of a yard of cloth cost $\frac{7}{8}$ of a dollar, how much will $\frac{1}{12}$ of a yard cost?

Ans. $\frac{3}{4}$ yd. costs $\$ \frac{7}{8}$; $\frac{1}{4}$ yd. costs $\frac{7}{24}$; 1 yd. cost $\frac{7}{6}$; $\frac{1}{12}$ yd. costs $\frac{7}{12}$ of $\frac{7}{6} = \$ \frac{49}{12}$.

$$\text{118. Simplify } \frac{\frac{2}{3} + 1\frac{3}{4} \div 2\frac{11}{12} - 1\frac{1}{12}}{\frac{2}{3} - \frac{7}{8} \times \frac{1}{5}} \div 8.$$

$$\text{Ans. } \frac{3}{25}.$$

119. Using a short process, multiply 246 by $33\frac{1}{3}$.
b) Using a short process divide 864 by $16\frac{2}{3}$.

Ans. $246 \div 3 = 82$; annex two ciphers = 8200;
 $864 \times 6 = 5184$; point off two decimal places = 51.84.

120. Change the couplet $\frac{25}{48} : \frac{5}{96}$ to the integral form in its lowest terms.

$$\text{Ans. } \frac{25}{48} \div \frac{5}{96} = \frac{25}{48} \times \frac{96}{5} = \frac{10}{1} = 10:1.$$

C. Decimals and U. S. Money.

121. a) Multiply eighteen and five hundred seventy-five thousandths by one thousand six hundred forty-six hundred-thousandths and divide the product by seven hundred and forty-three millionths. b) Express the result in words.

Ans. a) $18.575 \times .01646 = .3057445$; $.3057445 \div .000743 = 411.5$. b) Four hundred eleven and five-tenths.

122. A person bought 8 building lots for \$350 each and \$12 for \$525 each. What was the average price paid per lot?

Ans. $\$350 \times 8 = \$2,800$; $\$525 \times 12 = \$6,300$
 $(\$6,300 + \$2,800) \div (8 + 12) = \$455$.

123. Divide .00144 by 1.2.

Ans. $.00144 \div 1.2 = .0012$.

124. Multiply 120.006 by .0875, to the product add .54, and divide the sum by forty-five millionths.

Ans. $(120.006 \times .0875 + .54) \div .000045 = 245345$.

125. Write both in figures and in words four units of the seventh integral order, three of the fifth, nine of the second, five of the third order of decimals, and six of the fifth.

Ans. 4030090.00506. Four million, thirty thousand, ninety and five hundred six ten-thousandths.

126. How much must be added to one hundred twenty-five thousandths to make one hundred twenty and five thousandths? Express your answer in words.

Ans. $120.005 - .125 = 119.880$. One hundred nineteen and eighty-eight hundredths.

127. Make a receipted bill of the following: J. L. Robbins & Co. sold this day to Samuel Jones 8 yards cloth at $37\frac{1}{2}$ cents, 24 yards calico at $8\frac{1}{3}$ cents, 1 dozen handkerchiefs at $12\frac{1}{2}$ cents and 3 dozen towels at \$2.50 a dozen.

Ans.

Albany, N. Y., March 1, 1907.

Mr. Samuel Jones

To ROBBINS & CO., Dr.

3 yds. cloth.....	@ $37\frac{1}{2}$ c.	\$3.00
24 yds calico.....	@ $8\frac{1}{3}$ c.	2.00
1 doz. handkerchiefs.....	@ $12\frac{1}{2}$ c.	1.50
3 doz. towels.....	@\$2.50 doz.	7.50

\$14.00

Received Payment,
 ROBBINS & CO.

128. Reduce to an equivalent decimal $\frac{13}{40}$.

Ans. .325.

129. From the sum of eight hundred ten thousand and eight hundred ten-thousandths, take their difference and write the result in words.

Ans. Sixteen-hundredths.

130. To the product of 8.035 by .0035 add three, and divide the sum by .000625.

Ans. $(8.035 \times .0035 + 3) \div .000625 = 4844.996.$

131. What is the equivalent of $\frac{1}{225}$ in the decimal form?

Ans. .01230769 +

132. Multiply four hundred and sixteen thousandths by four hundred sixteen thousandths and divide the product by four.

Ans. $.400.016 \times .416 \div 4 = 41.601664.$

133. If 4c. buys an 8 oz. loaf when flour is \$6 a barrel, how large a loaf should be bought for 5c. when flour is \$7 a barrel? Solved by proportion.

Ans.
$$\frac{5 \times 8 \times 6}{4 \times 7} = 8 \frac{4}{7}.$$

134. Make a receipted bill for the following transaction: On May 1, 1897, William Phelps bought of John Smith the following books: 25 algebras at 70 cents, 20 arithmetics at \$1.12, 18 readers at 95 cents, 2 dictionaries at \$3.75.

Ans.

Albany, N. Y., June 1, 1897.

Mr. William Phelps

To JOHN SMITH, Dr.

May 1.	25 algebras	@ 70c.	\$17.50
	20 arithmetics	@ \$1.12	22.40
	18 readers	@ 95c.	17.10
	2 dictionaries	@ \$3.75	7.50

\$64.50

Received Payment,
JOHN SMITH.

135. A farmer delivered four loads of hay weighing in the gross 4,777, 3,860, 3,654, 3,609 lbs. respectively. The weight of his sleigh and hay rack is 1,380 lbs.; how much is due him at \$11.75 per ton for his hay?

Ans. $4777 + 3860 + 3654 + 3609 = 15900$; $15900 - 1380 \times 4 = 10380$; $\$11.75 \times 10380 \div 2000 = \60.9825 .

136. If 13 crates of oranges cost \$73.45, what will 35 crates cost at the same rate?

Ans. $\$73.45 \div 13 \times 35 = \197.75 .

137. What will 8,824 lbs. of hay cost, if 2,000 lbs. cost \$15?

Ans. $\$15 \times 8824 \div 2000 = \66.18 .

NOTE.—In problems involving the price of a ton, divide the pounds by 2000.

138. Multiply eight thousand by nine thousandths and divide the product by twenty-four millionths.

Ans. $8000 \times .009 = 72$; $72 \div .000024 = 3000000$.

139. Add the following: 2468.9; 13579; 100.06; 6042.9601; 187.306; 6.4396.

Ans. 22384.6657.

140. If a stenographer charges \$3.51½ for an article containing 37 folios, how much should he receive for one of 85 folios?

Ans. $\$3.515 \div 37 \times 85 = \8.075 .

141. What is the cost of 6874 feet of boards at \$35.75 per thousand?

Ans. $\$35.75 \times 6874 \div 1000 = \245.7455 .

142. What order is produced (a) when hundreds are multiplied by hundreds? (b) When millionths are multiplied by hundredths? (c) When ten millionths are multiplied by thousandths? (d) When ten thousandths are multiplied by ten-thousandths?

Ans. a) The fifth integral order. b) Hundred-millionths, 8th decimal. c) Ten-thousandths, 4th decimal. d) The first integral order.

143. Write (a) seven eighths per cent.; (b) four hundred thousandths; six hundred millionths; (d) a couplet expressing the ratio of two rods to eight feet.

Ans. $\frac{7}{8}\%$; .400; .000600; 33:8.

144. Make out and receipt bill for the following:

18	pounds steak	@	24c
$4\frac{1}{2}$	doz. eggs		36c
3	quarts molasses		18c
1	bushel potatoes		75c
5	pounds sugar		$3\frac{1}{2}c$

Ans.

Albany, N. Y., March 1, 1907.

Mr. John Smith

To WILLIAM MILLER, Dr.

18	lbs. steak	.....@	24	c.	\$4.32
$4\frac{1}{2}$	doz. eggs	.....@	36	c.	1.62
3	qts. molasses	.....@	18	c.	.54
1	bu. potatoes	.....@	75	c.	.75
5	lbs. sugar	.....@	$3\frac{1}{2}c$		.17 $\frac{1}{2}$
					<hr/>
					\$7.40 $\frac{1}{2}$

Received Payment,
WILLIAM MILLER.

145. $(59946 + 123 + 1.049 + .00912 + 60.003 + 78649) - (600 - .0004) = ?$

Ans. 138,179.06152.

146. Bought 18970 lbs. of hay at \$9 a ton, and 12580 lbs. of straw at \$7 a ton; sold the hay at 75 cents a hundred pounds and the straw at 60 cents a hundred pounds; find the entire gain.

Ans. $\$9.00 \div 20 = \$.45$; $\$.75 - \$.45 = \$.30$; $18970 \div 100 \times .30 = \56.91 ; $\$7.00 \div 20 = \$.35$; $\$.60 - \$.35 = \$.25$; $12580 \div 100 \times \$.25 = 31.45$; $\$56.91 + \$31.45 = \$88.36$.

147. Write in words the local value of each significant figure in the number 6,034.00852.

Ans. Six units of the fourth integral order, three of the second, four of the first, eight of the third decimal order, five of the fourth, and two of the fifth.

148. Change (a) .00075 to the form of per cent.; (b) $\frac{3}{8}\%$ to the form of a decimal; (c) $.048\frac{4}{7}$ to the form of a common fraction in its lowest terms; (d) $\frac{9}{64}$ to the form of a decimal.

Ans. (a) .00075 = .075%. (b) $\frac{3}{8}\% = .00625$.
(c) $.048\frac{4}{7} = \frac{17}{350}$. (d) $\frac{9}{64} = .140625$.

149. Write the following in one connected expression, using figures and signs of operation: The sum of three hundred seventy-five thousandths and six hundred twenty-five ten-thousandths multiplied by the remainder of twelve and five tenths minus twelve and forty-six hundredths; this product is divided by thirty-five. Perform the operations indicated.

Ans. $.375 + .0625) \times (12.5 - 12.46) \div 35 = .0005$.

150. What order of unit, integral or decimal, is produced when (a) thousandths are multiplied by thousandths; (b) thousandths are divided by millionths; (c) hundreds are divided by hundredths. (Explain how the required order may be determined by inspection in any one of the above.)

Ans. See any standard arithmetic.

151. By the terms of a will, \$3,500 out of an estate of \$59,645.84 was bequeathed to a hospital, and the remainder to the testator's children to be divided equally, each of whom received \$9,357.64. Required the number of children.

Ans. $(\$59,645.84 - \$3,500) \div 9357.64 = 6$.

152. From six million four thousand take the sum of 367428.009; 938976.0742 and 98.714.

Ans. 4,697,497.2028.

153. Find the total cost of 17 firkins of butter each containing 56 pounds at 23c a pound, 465 pounds of sugar at \$5.75 per hundred weight, 250 pounds of hay at \$8 a ton and 4 dozen pairs of gloves at 65c a pair.

Ans. $\$.23 \times 56 \times 17 = \218.96 ; $\$.75 \times 465 \div 100 = \26.7375 ; $\$.8 \times 250 \div 2000 = \1.00 ; $\$.65 \times 12 \times 4 = \31.20 ; $\$218.96 + \$26.7375 + \$1. + \$31.20 = \$277.8975$.

154. Find the total cost of 43 yards of Brussels carpet at $\$1.67\frac{1}{2}$ a yard, 25 yards of ingrain carpet at $\$.79$ a yard and $12\frac{3}{4}$ yards of oilcloth at $\$.37\frac{1}{2}$ a yard.

Ans. $1.675 \times 43 = \$72.025$; $\$.79 \times 25 = 19.75$; $\$.375 \times 12.75 = 4.78125$; $\$72.025 + \$19.75 + \$4.78125 = \96.55625 .

155. If the cost of maintenance for 897 inmates of a state institution is $\$185,291.44$ what should be the cost of 1927 inmates?

Ans. $\$185,291.44 \div 897 = \206.56793 for one; $\$206.56793 \times 1927 = \$398,076.40$.

156. Divide thirty and six hundredths times thirty-six hundredths by the sum of sixteen hundredths and seven thousandths.

Ans. $30.06 \times 36 \div (.16 + .007) = 64.8$.

157. A man bought a farm of 196 acres for $\$9,800$ and after spending $\$980$ for improvements, sold the farm at $\$66$ an acre; what was his gain?

Ans. $196 \times 66 = 12936$; $\$9800 + \$980 = \$10780$; $\$12936 - \$10780 = \$2,156$.

158. If coal is bought at $\$6$ per ton and sold at the rate of 30c per basket of 80 pounds, what is gained per ton?

Ans. $2000 \div 80 = 25$; $\$.30 \times 25 = \7.50 ; $\$7.50 - \$6.00 = \$1.50$.

159. A receives $\$1.50$ per day for labor and B $\$2$ per day, but A works $2\frac{3}{8}$ times as many days as B; together they earn $\$35.60$. How much should each receive?

Ans. $\$.150 = \frac{3}{2}$; $2\frac{3}{8} \times \frac{3}{2} = \frac{57}{16}$; $\frac{16}{16} \times 2 = \frac{32}{16}$; $\frac{57}{16} - \frac{32}{16} = (\$.40 \times 57) = \$22.80$ A's share; $\frac{32}{16} =$

$$\begin{aligned} \$40 \times 32 &= \$12.80 \text{ B's share.. } \frac{57}{16} + \frac{72}{16} = \frac{129}{16}; \\ \frac{1}{16} &= \$35.60 \div 89 = \$40. \end{aligned}$$

D. Measures and Measurements.

160. From 19 sq. yd. 6 sq. ft. 72 sq. in. take 16 sq. yd. 6 sq. ft. 112 sq. in.

Ans.	Sq. yds.	Sq. ft.	Sq. in.
	19	6	72
	16	6	112
	<hr/>		
	2	8	104

161. In 2224523" how many signs?

Ans. $2224523 \div 60 \times 60 \times 30 = 20 +$ or $20\frac{5}{8}$ approx.

162. A cylindrical bin is 10 ft. in diameter, and 8 ft. high. Find capacity in bushels.

Ans. $(10 \times 3.1416) \times \frac{1}{2} (\frac{10}{2}) \times 8 = 628.32$ cu. ft.; 628.32 cu. ft. $\div 2150.42$ cu. inches $= 504.89$ bu.

163. How many square feet of surface are there on the outside of a covered dry-goods box 4 ft. 4 in. by 3 ft. 6 in. by 3 ft. 2 in.?

Ans. $2 \times 4\frac{1}{2}$ ft. $\times 3\frac{1}{2}$ ft. $= 27\frac{1}{2}$; $2 \times 4\frac{1}{2}$ ft. $\times 3\frac{1}{2}$ ft. $= 30\frac{1}{2}$; $2 \times 3\frac{1}{2}$ ft. $\times 3\frac{1}{2}$ ft. $= 22\frac{1}{2}$; $27\frac{1}{2} + 30\frac{1}{2} + 22\frac{1}{2} = 79\frac{1}{2}$ sq. ft.

164. Find the cost, @ \$8 per M, of 420 joists 18' long 10" wide and 4" thick.

Ans. $420 \times 18 \times \frac{5}{8} \times 4 = 25200$; $25200 \div 1000 = 25.2$; $\$8 \times 25.2 = \201.60 .

165. To what depth will 240 gallons fill a vat 11 feet long and 7 feet wide? [1 gallon = 231 cubic inches.

Ans. 11 ft. $\times 7$ ft. $= 11,088$ sq. in.; $231 \times 240 = 55,440$ cu. in.; $55440 \div 11088 = 5$ inches.

166. In a cistern 10 feet \times 6 fet. the water measured 4 ft. deep; how many gallons had been drawn when it measured 2 ft. 9 in. deep?

Ans. $10 \times 6 \times 4 - 10 \times 6 \times 2\frac{3}{4} \times 1728 \div 231 = 561.038.$

167. How many tiles 9 in. square would be needed for a floor 8 yd. long and 3 yd. wide?

$$\text{Ans. } \frac{8 \times 36 \times 3 \times 36}{9 \times 9} = 384.$$

168. If 3 M. ft. of lumber cost \$86, what will 8350 ft. cost at the same rate? (Solve by proportion.)

$$\text{Ans. } 3 : \frac{8350}{1000} = 86 : \times; \frac{8350}{1000} \times 86 \div 3 = \$239.36.$$

169. How many board feet are there in a stick of timber 28 ft. by 16 in. by 14 in.?

$$\text{Ans. } 28 \times \frac{1}{2} \times 14 = 522\frac{1}{2} \text{ ft.}$$

170. The captain of a ship observes the sun at noon while his chronometer, set by Greenwich time, indicates 2.15 p. m. In what longitude is the ship?

$$\text{Ans. } 2 \text{ hrs. } 15 \text{ min.} \times 15 = 33^\circ 45' \text{ east longitude.}$$

171. Find the cost, @ \$2.80 per M, of laths for the walls and ceiling of a room 20' x 18' and 9' high; 1000 laths cover 70 square yards.

$$\text{Ans. } (20 \times 9) \times 2 = 360; (18 \times 9) \times 2 = 324; 20 \times 18 = 360; 360 + 324 + 360 = 1044 \text{ sq. feet; } 1044 \div 70 \text{ sq. yds.} = 1^{\frac{2}{35}}; \$2.80 \times 1^{\frac{2}{35}} = \$4.64.$$

172. What must be the height of a bin 10 ft. long and 4 ft. wide to hold 10 tons of coal, allowing the weight of a cubic foot of coal to be 56 lbs.?

$$\text{Ans. } 10 \times 2000 \div 56 = 357.14 \text{ cu. ft. coal; } 357.14 \div 10 \times 4 = 8.9285 \text{ ft.}$$

173. Find the outside surface of an uncovered cubical box 3 ft. 6 in. on each edge.

$$\text{Ans. } 6 (3\frac{1}{2} \text{ ft.} \times 3\frac{1}{2} \text{ ft.}) = 73\frac{1}{2} \text{ sq. feet.}$$

174. How many sacks will hold 35 bushels 2 pecks 7 quarts of grain, if one sack holds 1 bushel 3 pecks 7 quarts 1 pint.

Ans. $2286 \div 127 = 18$ sacks.

175. Required the length of one side of a square field containing 20 acres. (Correct to two decimal places.)

Ans. $160 \times 20 = 3200$; $\sqrt{3200} = 56.56$ rods.

176. A cylindric cistern 6 feet deep is 7 feet in diameter; how many gallons will it hold? [1 gallon = 231 cubic inches.]

Ans. $\frac{7}{2} =$ radius, $\frac{7}{2} \times \frac{7}{2} \times 3.1416 = 230.9076$ cu. ft. $230.9076 \times 1728 = 399008.3328$; $399008.3238 \div 231 = 1727.3087$ gals.

177. A cycling party rode $75\frac{1}{4}$ miles at the average rate of $10\frac{1}{2}$ miles per hour. If they started at 9:55 a. m., at what hour did they complete the trip?

Ans. $75\frac{1}{4} \div 10\frac{1}{2} = 7\frac{1}{6}$ hrs. 9:55 A. M. + $7\frac{1}{6} = 5:05$ P. M.

178. How high is a flagstaff whose shadow is 81 feet long when a flagstaff 30 feet high casts a shadow 36 feet long? Write the proportion.

Ans. $\times : 30 = 81 : 36$; $\frac{30 \times 81}{36} = 67\frac{1}{2}$ ft.

179. The area of a lawn whose length is twice its breadth is 392 square yards; find the length and breadth of the lawn.

Ans. $x =$ breadth; $2x =$ length; $x(2x) = 392$; $2x^2 = 392$; $x^2 = 196$; $x = 14$ yds. wide; $2x = 28$ yds. long.

180. A bicycle wheel 88 inches in circumference must make how many revolutions a minute to run eighteen miles an hour?

Ans. $5280 \times 18 \times 12 \div 88 \times 60 = 216$ revolutions.

181. If a grain of gold is beaten out into 54 square inches of leaf, what weight of gold will be required to cover a cube $1\frac{1}{2}$ feet on each edge?

Ans. $6 (1\frac{1}{2} \text{ ft.} \times 1\frac{1}{2} \text{ ft.}) = \text{surface } 13\frac{1}{2} \text{ sq. ft.};$
 $13\frac{1}{2} \times 144 \div 54 = 36 \text{ gr.}$

182. Find the exact number of cubic yards in a cellar wall 18" thick and 8' high, the inside measurements of which are 60' x 30'.

$$\begin{aligned} \text{Ans. } & \frac{60 \times 8 \times 1\frac{1}{2}}{27} \times 2 = 53\frac{1}{3} \text{ sides;} \\ & \frac{30 \times 8 \times 1\frac{1}{2}}{27} \times 2 = 26\frac{2}{3} \text{ ends;} \\ & \frac{1\frac{1}{2} \times 1\frac{1}{2} \times 8}{27} \times 4 = 2\frac{2}{3} \text{ corners;} \\ & 53\frac{1}{3} + 26\frac{2}{3} + 2\frac{2}{3} = 82\frac{2}{3} \text{ cu. yds.} \end{aligned}$$

183. A coal bin $16\frac{1}{2}$ feet long and 8 ft. 9 in. wide must be how deep to contain 10 tons of coal, if one ton occupy 40 cubic feet of space?

Ans. $1 \times \frac{32}{2} \times \frac{35}{4} = 144\frac{3}{8} \text{ cu. ft.}; 10 \times 40 = 400$
 $\text{cu. ft.}; 400 \div 144\frac{3}{8} = 2.77 \text{ ft.}$

184. The diameter of a bicycle wheel is 28 inches; find the number of revolutions it makes in going 1 mile.

$$\text{Ans. } 5280 \times 12 \div 28 = 226.28 \text{ rev.}$$

185. How much will it cost to make an excavation 40 feet long, 30 feet wide, and 9 feet deep, at 32 cents per cubic yard?

$$\text{Ans. } \frac{40 \times 30 \times 9}{27} \times .32 = \$128.$$

186. If a cubic foot of water weighs 1000 ounces avoirdupois, find the weight of the water that can be put in a tank 6 ft. 6 in. by 2 ft. 8 in. by 2 ft. 3 in., inside measurements.

Ans. $6\frac{1}{2} \times 2\frac{2}{3} \times 2\frac{1}{4} = 39 \text{ cu. ft.}; 39 \times 1000 = 39000 \text{ oz. in tank. } 1 \text{ ton} = 32000 \text{ oz.}; 39000 \div 32000 = 1\frac{17}{32} \text{ tons.}$

187. How many rings, each weighing 6 pwt., 10 gr., can be made from 4 oz. 16 pwt. 6 gr. of gold?

$$\text{Ans. } \frac{4 \text{ oz. } 16 \text{ pwt. } 6 \text{ gr.}}{6 \text{ pwt. } 10 \text{ gr.}} = 15 \text{ rings.}$$

188. Find the cost of a block of granite 4 ft. long, 3 ft. wide and 2 ft. thick at 2.50 per cubic foot.

$$\text{Ans. } \$2.50 \times 4 \times 3 \times 2 = \$60.$$

189. How many rods of fence will be required to inclose a square field containing two acres.

$$\text{Ans. } 160 \times 2 = 320 \text{ sq. rd. } \sqrt{320} = 17.88 \text{ one side; } 17.88 \times 4 = 71.52 \text{ rds.}$$

190. How many acres in a rectangular field that is 50 chains long and 30 chains wide?

$$\text{Ans. } 10 \text{ sq. ch.} = 1 \text{ a. } (50 \times 30) \div 10 = 150 \text{ acres.}$$

191. How many cubic feet will a room contain which is 40 feet 6 inches long, 36 feet 9 inches wide, and 25 feet 10 inches high?

$$\text{Ans. } 40\frac{1}{2} \times 36\frac{3}{4} \times 25\frac{5}{8} = 38440\frac{14}{16} \text{ cu. ft.}$$

192. London is $77^{\circ} 1'$ east of Washington; what time is it at Washington when it is 12 M. at London?

$$\text{Ans. } 77^{\circ} 1' \div 15 = 5 \text{ hrs. } 8 \text{ min. } 4 \text{ secs; } 12 \text{ M. } - 5 \text{ hrs. } 8 \text{ min. } 4 \text{ secs.} = 6 \text{ hrs. } 51 \text{ min. } 56 \text{ secs. A. M.}$$

193. Find in feet the length of the shortest stick that can be exactly cut into pieces 4 in., 9 in., 12 in., or 15 in. in length.

$$\text{Ans. } \text{L. C. M.} = 180; 1 \text{ ft.} = 12 \text{ inches; } 180 \div 12 = 15 \text{ ft.}$$

194. Suppose the ceiling of your school-room to be 36 ft. long by 24 ft. wide. What would it cost to white-wash it at 7 cents a square yard?

$$\text{Ans. } 36 \text{ ft.} \times 24 \text{ ft.} = 96 \text{ sq. yds.; } 96 \times .07 = \$6.72.$$

195. Find the capacity in barrels of a tank 10 feet by 5 ft. 6 in. by 4 ft. 1 in. inside measurements.

$$10 \times \frac{11}{2} \times \frac{49}{12} \times 1728$$

$$\text{Ans. } \frac{\quad}{231 \times 31\frac{1}{2}} = 53\frac{1}{3} \text{ bbls.}$$

196. Reduce $\frac{9}{25}$ of an acre to square rods and decimals of a square rod.

$$\text{Ans. } \frac{9}{25} \times 160 = \frac{288}{5} = 57.6 \text{ sq. rds.}$$

197. How many bushels will a bin hold that is 7 feet long, 4 feet wide and $3\frac{1}{3}$ feet deep? [2150.4 cubic inches = 1 bushel.]

$$\text{Ans. } \frac{7 \times 4 \times 3\frac{1}{3} \times 1728}{2150.4} = 75 \text{ bu.}$$

198. The foot of a ladder 28 ft. long is placed 9 ft. from the base of a wall and the top of the ladder just reaches the top of the wall. How high is the wall?

$$\text{Ans. } (28)^2 - (9)^2 = 703; \sqrt{703} = 26.51.$$

199. A pile of wood is 6 ft. high 4 ft. wide; how long must it be to contain 10 cords?

$$\text{Ans. } \frac{128 \times 10}{6 \times 4} = 53\frac{1}{3} \text{ ft.}$$

200. If a railroad train moves a mile in 65 seconds, what is its rate an hour?

$$\text{Ans. } \frac{60 \times 60}{65} = 55\frac{5}{13} \text{ miles.}$$

201. What is the cost of 40 planks each 16 ft. long, 8 in. wide, $2\frac{1}{2}$ in. thick, at \$23 per M board measure?

$$\text{Ans. } \frac{40 \times 16 \times \frac{3}{8} \times \frac{5}{2}}{1000} \times 23 = \$24.53\frac{1}{2}.$$

202. How many acres in a rectangular field 402 rods 2 feet long and 120 yards wide?

$$\text{Ans. } \frac{402 \text{ rds. } 2 \text{ ft.} \times 120 \text{ yds.}}{160} = 54^{101/121} \text{ acres.}$$

203. In a stick of timber 18 ft. by $15\frac{1}{2}$ in. by 17 in., how many board feet?

$$\text{Ans. } 18 \times 15\frac{1}{2} \times 1\frac{1}{12} = \frac{1581}{4} = 395\frac{1}{4} \text{ bd. ft.}$$

204. Find the cost of excavating a cellar 30 ft. by 24 ft. by 9 ft. at 50 cents a cubic yard.

$$\text{Ans. } \$.50 \times \frac{30 \times 24 \times 9}{27} = \$120.$$

205. The square on the diagonal of a square room is 648 sq. ft. What will it cost to carpet the room with carpet $\frac{3}{4}$ yd. wide, at 90c. a yard.

$$\text{Ans. } 648 \div 2 = 324 \sqrt{324} = 18 \text{ ft. one side, } 18 \div 3 \times \frac{3}{4} = 8 \text{ strips, } 18 \div 3 \times 8 = 48 \text{ yds. } \$.90 \times 48 = \$43.20.$$

206. On what scale is a map drawn which is 12 in. by 15 in. and which represents an area of 72,000 sq. miles?

$$\text{Ans. } \frac{72000}{12 \times 15} = 400 \text{ sq. mi. to sq. in. } \sqrt{400} = 20 \text{ miles to the inch.}$$

207. A man buys an acre of land in the form of a rectangle with 66 feet fronting the street; how deep must the lot be?

$$\text{Ans. } \frac{160 \times 30\frac{1}{4} \times 9}{66} = 660 \text{ ft.}$$

208. Find the number of square yards in the entire surface of the four walls and ceiling of a room 18 feet six inches long, 12 feet 4 inches wide and 9 feet high.

Ans. $6\frac{1}{8} + 4\frac{1}{8} = \text{ceiling} = 25\frac{19}{32}$, $2 (6\frac{1}{8} \times 3) = 2 \text{ walls} = 37$, $2 (4\frac{1}{8} \times 3) = 2 \text{ walls} = 24\frac{3}{8}$; $25\frac{19}{32} + 37 + 24\frac{3}{8} = 87\frac{1}{32} \text{ sq. yds.}$

209. Find the cost (a) \$16.50 per M, of $1\frac{1}{2}$ " lumber for a board walk 5' wide inclosing a rectangular grass plot which is 60' x 40'.

$$\text{Ans. } \frac{\$16.50 \times 1650 \text{ ft.}}{1000} = \$17.22\frac{1}{2}.$$

210. Find the distance between the opposite corners of a rectangular lot 50 ft. by 66 ft. 9 in.

$$\text{Ans. } (50)^2 + (66\frac{3}{4})^2 = \frac{111289}{16} \sqrt{\frac{111289}{16}} = 333.6$$

$$\frac{333.6}{4} = 83.4.$$

211. How many cubic yards of earth are there in an excavation 3,000 feet long, 84 feet wide, and sloping from 4 feet in depth at one end to $8\frac{1}{4}$ feet at the other?

$$\text{Ans. } \frac{8\frac{1}{4} + 4}{2} \times 84 \times 3000 \div 27 = 57166\frac{2}{3} \text{ cu. yds.}$$

212. If 675 tiles each 6 inches square will cover a certain area, how many tiles 3 in. x 4' in. would be required for the same amount of surface? (Solve by compound proportion.)

$$\begin{array}{l} 3 : 6 :: 675 : x \\ 4 : 6 :: \\ 6 \times 6 \times 675 \end{array}$$

$$\text{Ans. } \frac{6 \times 6 \times 675}{3 \times 4} = 2025 \text{ tiles.}$$

213. Find the cost of 25 joints 4 in. by 6 in., 16 ft. long at \$18 per M board measure.

$$\text{Ans. } \frac{25 \times (4 \times \frac{1}{2} \times 16)}{1,000} \times \$18 = \$14.40.$$

214. If the longitude of Washington is $77^\circ 1'$ West and that of New Orleans is $89^\circ 2'$ West, when it is noon at Washington what time is it at New Orleans?

$$\text{Ans. } \frac{89^\circ 2' - 77^\circ 1'}{15} = 43 \text{ min. } 4 \text{ sec.}; 12 \text{ M} - 48 \text{ min. } 4 \text{ secs.} = 11 \text{ hrs. } 11 \text{ min. } 56 \text{ secs. A. M.}$$

215. At 28c a cubic yard, what is the cost of excavating, in a hillside, a cellar 110 ft. long, 84 ft. wide and $3\frac{1}{2}$ feet deep at one end and 8 ft. deep at the other end?

$$\text{Ans. } \$.28 \times \frac{3\frac{1}{2} + 8}{2} \times 84 \times 110 \div 27 = \$550.98.$$

216. A farmer has a farm of 16 A. 53 sq. rd. to divide into lots of 1 A. 41 sq. rd. each. How many lots will it make?

$$\text{Ans. } \frac{16 \text{ A. } 53 \text{ sq. rd. } \quad 2613}{1 \text{ A. } 41 \text{ sq. rd. } \quad 201} = \frac{2613}{201} = 13 \text{ lots.}$$

217. Find the number of cubic feet of ice on a rectangular pond 17 rods long and 6 rods wide the ice being $1\frac{1}{2}$ feet thick.

$$\text{Ans. } 17 \times 16\frac{1}{2} \times 6 \times 16\frac{1}{2} \times 1\frac{1}{2} = 41654\frac{1}{4} \text{ cu. ft.}$$

218. A square field contains 40 acres. What will it cost to fence it at \$.60 a rod?

$$\text{Ans. } 4 \times \sqrt{160} \times 40 \times \$.60 = \$192.$$

219. A man travels from New York, longitude 74° west, for 8 days 6 hours, when he finds that his watch, which gains 3 minutes a day, is 8 hours 20 minutes 10 seconds slow; what longitude has he reached?

$$\text{Ans. } 8\frac{1}{4} \times 3 + (8 \text{ hrs. } 20 \text{ min. } 10 \text{ sec.}) \times 15 - 74^\circ = 57^\circ 13' 45'' \text{ E.}$$

220. Find the number of acres in a circular park whose diameter is 280 rods.

$$\text{Ans. } (140)^2 \times 3.1416 \div 160 = 384.846.$$

221. The area of a rectangular garden is $\frac{3}{4}$ of an acre, the length of one side is 50 feet. Find the length of the adjacent side.

$$\text{Ans. } 160 \times \frac{3}{4} \times 30\frac{1}{4} \times 9 \div 50 = 653\frac{3}{5}.$$

222. In a pile of wood 20 ft. long, 6 ft. wide and 6 ft. high, how many cords?

$$\text{Ans. } \frac{20 \times 6 \times 6}{128} = 5\frac{5}{8}$$

223. Find the length of a board containing $22\frac{1}{8}$ square feet, the two ends of which are 16 inches and $13\frac{1}{2}$ inches respectively.

$$\text{Ans. } (22\frac{1}{8} \times 144) \div \frac{16 \times 13\frac{1}{2}}{2} = 216 \text{ in.} = 18 \text{ ft.}$$

224. Find in rods the perimeter of a square field containing $5\frac{3}{8}$ A. (Correct to one decimal place.)

$$\text{Ans. } 160 \times 5\frac{3}{8} = 860, \sqrt{860} = 29.32 \text{ rd. one side;} \\ 29.32 \times 4 = 117.28.$$

225. New York is in 74° west longitude and Manila is in 121° east longitude. When it is 6 o'clock A. M. at New York, what is the time at Manila?

$$\text{Ans. } 121 + 74 = 195; 360 - 195 = 165 \text{ real} \\ \text{difference; } 165 \div 15 = 11 \text{ hrs. earlier.}$$

226. A has two farms; the first is 138 rods square; the second contains three times as many acres as the first; how many acres does the second contain?

$$\text{Ans. } (138)^2 \div 160 \times 3 = 357\frac{3}{14}.$$

227. It is 4:30 P. M. by a ship's chronometer set by Greenwich time when the sun is on the meridian. What is the longitude of the ship?

$$\text{Ans. } (4 \text{ hrs. } 30 \text{ min.}) \times 15 = 67^\circ 30' \text{ W.}$$

228. Find the cost of two-inch plank 12 feet long for a walk 50 feet long, 6 feet wide, at \$14.25 per M., board measure.

$$\text{Ans. } 2 \times 50 \times 6 = 600 \text{ board ft.; } \$14.25 \times 600 \div \\ 1,000 = \$8.55.$$

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229. Find the cost, @ 60c. a yard, of carpeting a room 16 feet 4 inches wide and 21 feet 6 inches long with carpet 27 inches wide, if the strips of carpet run lengthwise.

Ans. 16 ft. 4 in. = $5\frac{1}{3}$ yd.; 21 ft. 6 in. = $7\frac{1}{2}$ yds.; $5\frac{1}{3} \div \frac{3}{4} = 8$ strips; $7\frac{1}{2} \times 8 = 57\frac{1}{2}$; $57\frac{1}{2} \times .50 = \34.40 .

230. A pole 153 ft. long, standing 10 ft. in the ground, breaks off even with the surface of the ground; the falling part is broken into two pieces; $\frac{1}{3}$ of the longer piece equals the length of the shorter. Find the length of each piece.

Ans. $153 - 10 = 143$ broken part; $x =$ long piece; $\frac{1}{3}x =$ short piece; $\frac{2}{3}x = 143$; $x = 99$; $\frac{1}{3}x = 44$.

231. Find the length of a board containing $22\frac{1}{2}$ square feet of lumber, the ends of which are respectively 14 inches and 16 inches wide.

Ans. $(22\frac{1}{2} \times 144) \div \frac{16 + 14}{2} = 216$ in. = 18 ft.

232. Find the value in avoirdupois weight of $87\frac{1}{2}$ lb. Troy weight. (1 lb. avoirdupois = 7000 gr.)

Ans. $\frac{5760 \times 87\frac{1}{2}}{7000} = 72$.

233. A grocer sold from a hogshead of molasses at various times the following quantities: 9 gal. 2 qt.; 7 gal. 1 qt. 2 pt.; 3 qt.; 18 gal.; 12 gal. 2 pt. How much still remained in the hogshead?

Ans. 15 gals.

234. Find the cost at \$50 an acre of a rectangular field 1650 feet long and 825 feet wide.

Ans. $\frac{1650 \times 825}{1A} = 31.25A$; $31.25 \times \$50 = \1562.50 .

235. Reduce 5 mi. 37 ch. 62 l. to links.

Ans. 43,762 links.

236. What is the cost of 5 bu. 3 pks. 5 qts. of wheat at \$1.20 a bushel?

Ans. 5 bu. 3 pks. 5 qts. = 189 qts.; $189 \div 32 \times \$1.20 = \$7.08\frac{3}{4}$.

237. Find the cost, @ 45c. a roll, of papering the walls of a room $16\frac{1}{2}$ feet long, 15 feet wide and 12 feet high, making no allowances for openings. [A roll of paper is 8 yards long and 18 inches wide.]

Ans. $16\frac{1}{2}$ ft. = $5\frac{1}{2}$ yds.; 15 ft. = 5 yds.; 12 ft. = 4 yards.; $2 (5\frac{1}{2} \times 4) = 44$ sq. yds.; $2 (5 \times 4) = 40$ sq. yds.; $44 + 40 = 84$ sq. yds.; 18 in = $\frac{1}{2}$ yd.; $\frac{1}{2} \times 8 = 4$ sq. yds. in 1 roll; $84 \div 4 = 21$; $.45 \times 21 = \$9.45$.

238. A rectangular field twice as long as it is wide contains 7 acres and 32 square rods. Find the length of the field.

Ans. 48 rods.

239. Using established abbreviations or conventions, write (a) thirty-four minutes six seconds circular measure; (b) twelve chains forty links five inches; (c) fourteen acres ninety square rods one hundred twenty-seven square feet.

Ans. (a) 34' 6".

(b) 12 ch., 40 l., 5 in.

(c) 14 A., 90 sq. rd., 127 sq. ft.

240. A bin that holds 100 bushels is 6 feet long and 6 feet wide; how high is it?

Ans. $2150.4 \times 100 \div 6 \times 12 \times 6 \times 12 = 41.481$ in. = 3 ft. 5.48 in.

241. If £211 7s. 3d. be equally divided among 4 persons, how much will each receive?

Ans. £211, 7s., 3d. $\div 4 =$ £52, 16s., 9d., 3f.

242. A cistern that holds 50 barrels is 6 feet square; how deep is it?

Ans. $231 \times 31\frac{1}{2} \times 50 \div 6 \times 12 \times 6 \times 12 = 70.16$
in. = 5 ft., 10.16 in.

243. The longitude of Philadelphia is $75^{\circ} 10'$ west and that of Berlin is $13^{\circ} 23' 53''$ east; what is the time in Berlin when it is 12 M. in Philadelphia.

Ans. $(75^{\circ} 10' + 13^{\circ} 33' 53'') \div 15 = 5$ hrs., 54 min.
 $15^{\circ}/_{15}$ secs.; $12 \text{ M} + 5$ hrs., 54 min., $15^{\circ}/_{15}$ secs. = 5
hrs., 54 min., $15^{\circ}/_{15}$ secs. P. M.

244. How much will it cost to cover a screen 18 feet long and 6 feet high with cloth one yard wide, at 8 cents a yard?

Ans. $\frac{18 \times 6}{9} \times .08 = \$96.$

245. What is the length of a plank $1\frac{1}{2}$ in. thick, 1 ft. 6 in. wide, containing 36 board feet?

Ans. $36 \div 1\frac{1}{2} \times 1\frac{1}{2} = 16.$

246. Find the cost, @ 1.17 a yard, of carpeting a room $18' 8'' \times 15' 9''$, with carpet 27" wide, if the strips of carpet run lengthwise.

Ans. $\frac{15' 9''}{27''} = 7$ strips; $7 \times 18' 8'' = 43^{\circ}/_{100}$ sq. yds.;
 $\$1.17 \times 43^{\circ}/_{100} = \$50.95.$

247. If the longitude of Boston is $71^{\circ} 31'$ west and that of San Francisco is $122^{\circ} 24'$ west, what is the difference in the time of the two places?

Ans. $(122^{\circ} 24' - 71^{\circ} 31') \times 4 = 3$ hrs., 23 min., 32 secs.

248. Find the cost of the following items of lumber:

3 pieces $8'' \times 6'' \times 12'$ at \$17 a 1,000 feet
30 pieces $12'' \times 2'' \times 14'$ " 20 a "
20 pieces $10'' \times \frac{7}{8}'' \times 16'$ " 25 a "

Ans. \$25.08.

249. If a plow turns a furrow 10 inches wide what is the total length of all the furrows turned in plowing a 10 acre field?

Ans. $\sqrt{160 \times 10} = 40$; $16\frac{1}{2} \times 40 \times 12 = 7,920$ inches, length of one side; $(7,920 \div 10) 40 \div 320 = 99$ miles.

250. A traveler whose watch was set to the time at Washington, 77° west, upon arriving at his destination found the local time to be 2:20 P. M., but by his time it was 8:15 A. M. of the same day. Find the longitude of his place of destination.

Ans. (14 hrs., 20 min. — 8 hrs., 15 min.) — $77^\circ = 14^\circ 15'$.

251. Find the convex surface of a right triangular pyramid the sides of whose base are each 8 inches long, and whose slant height is 20 inches.

Ans. $3 \times 8 \times (20 \div 2) = 240$ sq. inches.

252. A fence 8 wires high is placed around a square field containing 10 acres. Compute the cost if each wire weighs 1 pound to the rod and costs $2\frac{1}{2}$ c. a pound and the posts are placed 1 rod apart and cost 15c each.

Ans. $\sqrt{160 \times 10} =$ perimeter; $160 \times 8 = 1,280$ rods of wire; $(1,280 \times .02\frac{1}{2}) + (160 \times .15) = \56.00 .

253. The longitude of Boston being $71^\circ 3' 30''$ W, and that of Buffalo $78^\circ 55'$, what is the clock time at Buffalo when it is noon at Boston?

Ans. $(78^\circ 55' - 71^\circ 3' 30'') \div 15 = 31$ min., 26 sec.; 12 M. — 31 min. 26 sec. = 11 hrs., 28 min., 34 secs.

254. Multiply 31 rd. 3 yd. 2 ft. by 8.

Ans. 2 mi., 13 rd., 1 yd., 2 ft., 6 in.

255. Divide 168 bu. 1 pk. 6 qt. by 4 bu. 3 pk. 2qt.

Ans.
$$\frac{168 \text{ bu., 1 pk., 6 qt.}}{4 \text{ bu., 3 pk., 2 qt.}} = \frac{5390}{154} = 35$$

256. Reduce 17 gal. 2 qt., liquid measure, to fraction of a barrel.

Ans. $31\frac{1}{2}$ gals. = 1 bbl.; $17\frac{1}{2} \div 31\frac{1}{2} = \frac{2}{3}$.

257. When it is 12 M in New York (74° west), what is the time in Manila (120° east)?

Ans. $360^{\circ} - (740 + 120^{\circ}) \div 15 = 11$ hrs., 4 min.
 12 M — 11 hrs., 4 min. = 12.56 A. M.

258. The contents of a bin are 560 cubic feet; find how many tons of coal the bin will hold. [1 bushel coal = 2,150.4 cubic in. and weighs 80 lbs.]

Ans. $560 \times 1728) \div (2000 \div 80 \times 2150.4) = 18$ tons.

259. Find the cost of a lot 50 feet front 35 feet rear, and $62\frac{1}{2}$ feet deep, at \$3.50 per square foot?

Ans. $\frac{50 \times 35}{2} \times 62\frac{1}{2} \times \$3.50 = \$9,296.87\frac{1}{2}$.

260. A square field contains 10 acres. Find the cost of fencing it at 80c per rod.

Ans. $4 \times \sqrt{160} \times 10 \times .80 = \128 .

261. Find the base of a right angled triangle whose perpendicular is 10 inches and the hypotenuse $21\frac{1}{4}$

Ans. $(21\frac{1}{4})^2 - (10)^2 = \frac{5625}{16}$; $\sqrt{\frac{5625}{16}} = \frac{75}{4} = 18\frac{3}{4}$ in.

262. A ship sails at the rate of 12 miles an hour due northeast for 5 hours and then due southeast for $6\frac{1}{2}$ hours. Considering the surface a plane, how far is she from the starting point measured in a straight line?

Ans. $(5 \times 12)^2 \times (5 \times 6\frac{1}{2})^2 = 9,684$; $\sqrt{9,684} = 98.4$ mi

263. Berlin is $13^{\circ} 23' 53''$ east longitude, and Boston is $71^{\circ} 4' 9''$ longitude. When it is 1:15 P. M. at Boston what time is it in Berlin?

Ans. 6 hr. 52 min. $52\frac{2}{15}$ sec. P. M.

264. How many feet, board measure, are in five boards, each 12 feet long and ten inches wide?

Ans. $12 \times \frac{5}{6} \times 5 = 50$ feet.

265. What will it cost, @ $8\frac{1}{2}$ c. a square yd., to paint the convex surface of a cylindric boiler 6 feet high and 5 feet in diameter?

Ans. $(3.1416 \times 5 \times 6) \div 9 = 10.372$; $10.372 \times .085 = \$88162$.

266. Find the number of shingles necessary to cover the pitched roof of a house if the length of the roof is 48' and the width of each side is 24', allowing 1000 shingles to 100 square feet.

Ans. $48 \times 24 \times 2 \times 1,000 \div 100 = 23,040$ shingles.

267. A room is 21 ft. by 31 ft. 6 in. Which costs the more and how much, to carpet it when the strips lie the long-way or when they lie the short way, carpet $\frac{3}{4}$ yd. wide @ 90 cents a yard?

(NOTE.—Count each strip a full breadth.)

Ans. 21 ft. = 7 yds.; 31 ft., 6 in. = $10\frac{1}{2}$ yds.; $7 \div \frac{3}{4} = 10$ strips; $10\frac{1}{2} \div \frac{3}{4} = 14$ strips; $14 \times 7 = 98$; $10 \times 10\frac{1}{2} = 105$; $(105 - 98) \times 7 = \$6.30$ strips running shortway.

268. How long must a ladder be to reach a window 15 feet high, if the foot of the ladder is 8 feet from the house?

Ans. $(15)^2 + (8)^2 = 289$; $\sqrt{289} = 17$ ft.

269. How many feet of lumber in a stick of timber 20' long and 10" square?

Ans. $20 \times \frac{5}{8} \times 10 = \frac{500}{8} = 166\frac{2}{3}$ ft.

270. When it is 10:45 P. M. at Portland, Me., $70^\circ 15'$ west longitude, it is what time at Rome, $12^\circ 27'$ east longitude?

Ans. 4 : 15 : 48 A. M. next day.

271. The area of a rectangular field is 25 acres, 140 square rods and one side is $47\frac{1}{2}$ rods long. What is the length of the other side?

Ans. 25 A., 140 rd. = 4,140 sq. rods; $4,140 \div 47\frac{1}{2} = 87\frac{9}{19}$ rods.

272. What length of fence would be required to enclose a square field of $8\frac{1}{4}$ acres?

Ans. $160 \times 8\frac{1}{4} = 1,320$; $\sqrt{1,320} = 36.33$; $36.33 \times 4 = 145.32$ rods.

273. What will it cost, @ 16c. a square foot, to cover with gold-leaf a circle 28 inches in diameter?

Ans. $28 \div 2 = 14$ inches, radius; 14 inches = $1\frac{1}{6}$ ft.; $(1\frac{1}{6})^2 \times 3.1416 \times .16 = \$.68$ +.

274. Find the cost of carpeting a room 27 ft. by 30 ft. with Brussels carpet $\frac{3}{4}$ yd. wide at \$1.25 per yard, breadths to run lengthwise, allowing a waste for matching of $\frac{1}{16}$ yds. on each strip.

Ans. 27 ft. = 9 yds.; 30 ft. = 10 yds.; $9 \div \frac{3}{4} = 12$ strips; $12 \times \frac{1}{16} = \frac{3}{4}$; $12 \times 10 \times \frac{3}{4} = 120\frac{3}{4}$; $\$1.25 \times 120\frac{3}{4} = \$150.93\frac{3}{4}$.

275. Lake Worth, Fla., is $26^{\circ} 30'$ north, and Lima is $12^{\circ} 40'$ south. Find the difference in latitude.

Ans. $39^{\circ} 10'$.

276. What will 4 cwt. 3 qr. 15 lb. of sugar cost at \$8.95 a cwt. (=100 lbs.)?

Ans. 4 cwt., 3 qr., 15 lb. = 490 lb.; $\$8.95 \times 490 \div 100 = \$43.85\frac{1}{2}$.

277. A man buys an acre of land in the form of a rectangle with 66 feet fronting the street; how deep must the lot be?

Ans. $160 \times 30\frac{1}{4} \times 9 \div 66 = 660$ ft.

278. A real estate agent purchases one section of a township; he desires to improve the property by running a roadway through the middle of the section. If the roadway is 44 feet in width, how many acres of the section will it occupy?

Ans. 1 acre = 43560 sq. feet; 1 section = 1 mile = 5280 feet; $5280 \times 44 \div 43560 = 5\frac{1}{2}$ acres.

279. Find the time required to fill a cistern 8 feet square and 5 feet deep by a pipe which admits water at the rate of 1 quart a second.

$$\text{Ans. } \frac{8 \times 8 \times 5 \times 1728}{231 \div 4} = 9575\frac{13}{231} \text{ sec.} = 2 \text{ hr. } 39 \text{ min. } 35\frac{13}{231} \text{ sec.}$$

280. Find the cost @ \$23 per M of a stick of lumber 30' long 10" wide and 8" thick.

$$\text{Ans. } 30 \times 10 \times \frac{2}{3} = 200; \frac{200}{1000} \text{ of } \$23 = \$4.60.$$

281. A pail 12" in diameter and 15" deep is full of water; find the weight of the water. [1 cubic foot of water weighs 62½ pounds.]

$$\text{Ans. } \frac{1}{2} \times \frac{1}{2} \times 3.1416 \times \frac{5}{4} \times 62.5 = 61.359375 \text{ lbs.}$$

282. Find the cost, @ \$8 per M, of 420 joists 18' long 10" wide and 4" thick.

$$\text{Ans. } \$8 \times 420 \times 18 \times 10 \times \frac{1}{8} \div 1000 = \$201.60.$$

283. A bin 8' × 25' holds 1440 bushels; find the height of the bin. [1 bushel = 2150.42 cubic inches.]

$$\text{Ans. } (2150.42 \times 1440) \div (8 \times 25 \times 144) = 8.96 \text{ ft.}$$

284. Find the cost of the following bill of lumber:
 7 pieces 12' x 10" x 2" at \$16.50 a 1000 feet.
 12 pieces 16' x 6" x 4" at 17.00 a 1000 feet.
 22 pieces 18' x 12" x 1" at 20.75 a 1000 feet.

$$\text{Ans. } \$17.19.$$

285. How many seconds are in the month of June?

$$\text{Ans. } 30 \times 24 \times 60 \times 60 = 2592000.$$

286. A watch loses 2½ minutes per day. It is set right on the 15th of March at 1 P. M. What will be the proper time when it indicates 9 A. M. on the 20th of April?

$$\text{Ans. } (\text{March } 16 \text{ days } 11 \text{ hrs.} + \text{April } 19 \text{ days } 9 \text{ hrs.}) \\ 2\frac{1}{2} = 1 \text{ hr. } 29 \text{ min. } 35 \text{ secs.; } 9 \text{ A. M.} + 1 \text{ hr. } 29 \text{ min. } 35 \text{ secs.} = 10:29:35 \text{ A. M.}$$

287. A circular park has a driving track around it; the outer circumference of the track is 440 yards and its width is 20 yards. Find the area of the park exclusive of the track.

Ans. $440 \div 3.1416 = 140.056$ dia.; $140.056 \div 2 = 70.028$ radius; $70.028 - 20 = 50.028$ radius of park; $(50.028)^2 \times 3.1416 = 7862.79$.

288. If a cubic foot of limestone weighs 175 lbs., what is the weight of 5 cubic yards?

Ans.
$$\frac{175 \times 5 \times 27}{2000} = 11.8125 \text{ tons.}$$

289. What is the depth of a watering trough 3 ft. 4 in. long, 1 ft. 9 in. wide, which holds 40 gallons?

Ans. $231 \times 40 \div 40 \times 21 = 11$ inches.

290. A merchant exchanged 21 barrels of flour at $\$5\frac{1}{2}$ a barrel, for 33 cords of wood. What did the wood cost him a cord?

Ans.
$$\frac{21 \times 5\frac{1}{2}}{33} = \$3.50.$$

291. Find the cost of each of the following:

325 feet of boards at \$12 a thousand.

3250 pounds of hay at \$10 a ton.

Ans. $\$12 \times 325 \div 1000 = \3.90 ; $\$10 \times 3250 \div 2000 = \16.25 .

292. A cistern 10' deep and $10\frac{1}{2}'$ in diameter was filled $\frac{1}{4}$ full of water; how many gallons of water were there in the cistern? [231 cubic inches = 1 gallon.]

Ans. 1295.4816 gals.

293. A room 24 ft. \times 28 ft. and 9 ft. high, has 3 doors each 3 ft. \times 8 ft. and 3 windows each 3 ft. \times 6 ft.; find the cost of plastering the walls and ceiling at 5c. a square yard, deducting one-half the openings.

Ans. $24 \times 2 \times 9 = 432$ sides; $28 \times 2 \times 9 = 504$ ends; $28 \times 24 = 672$ ceilings; $3 \times 3 \times 8 = 72$ doors; $3 \times 3 \times 6 = 54$ windows.

$$\frac{(432 + 504 + 672) - (72 + 54)}{9} \times .05 = \$8.23\frac{1}{2}.$$

294. The Empire State Express leaves New York at 8.30 A. M. and arrives in Buffalo at 4.45 P. M., a run of 440 miles; it stops at Albany, Utica, Syracuse and Rochester. Find the average speed per hour, allowing 3 minutes for each stop.

$$\begin{array}{r} \text{Ans. } [(12 - 8:30 + 4:45) \times 60 - (3 \times 4)] \div 440 = \\ \frac{43}{440} \text{ min. per mile; } 60 \div 1 \frac{43}{440} = 54 \frac{106}{161}. \end{array}$$

295. A man travels from New York, longitude 70° west, for 8 days 6 hours, when he finds that his watch, which gains 3 minutes a day, is 8 hours 20 minutes 10 seconds slow; what longitude has he reached?

Ans. $57^\circ 13' 45''$ E.

296. The captain of a ship observes the sun at noon while his chronometer, set by Greenwich time, indicates 2.15 P. M. In what longitude is the ship?

Ans. $33^\circ 45'$ W.

297. Find the cost, @ \$15 per M, of 75 pieces of lumber each $14' \times 16'' \times 1\frac{3}{4}''$.

$$\text{Ans. } \frac{\$15 \times 75 \times 14 \times \frac{1}{3} \times \frac{7}{4}}{1000} = \$36.75.$$

298. Find the cost, at 12 cents a square yard, of plastering the four walls and ceiling of a room 14 feet by 12 feet and 9 feet high, allowing 15 square yards for doors and windows.

$$\begin{array}{l} \text{Ans. Ceiling} = 14 \times 12 = 168 \text{ sq. ft.; } 2 \text{ walls} = \\ 2 (14 \times 9) = 252 \text{ sq. ft.; } 2 \text{ walls} = 2 (12 \times 9) = \\ 216 \text{ sq. ft. } \$12 \times (636 \div 9 - 15) = \$6.68. \end{array}$$

299. How many trees planted 33 feet apart will be required, to cover 10 acres in the shape of a rectangle

20 rods wide, if no allowance is made for space beyond the outside rows?

Ans. $160 \times 10 = 1600$ sq. rd.; $1600 \div 20 = 80$ l.; $80 \times 16\frac{1}{2} \div 33 = 40$; $20 \times 16\frac{1}{2} \div 33 = 10$; 40 trees within border; 10 trees within border; $40 \times 10 = 400$ within border; $41 \times 11 = 451$ using outside row.

300. The length of a rectangular field containing 20 acres is twice its breadth. Find the dimensions of the field.

Ans. 80 rods long; 40 rods wide.

301. Find the number of board feet in 20 joists 8 x 2 and 14 ft. long. *b)* Find the cost of the same at \$18 per M.

Ans. $14 \times \frac{2}{3} \times 2 \times 20 = \frac{1120}{3} = 373\frac{1}{3}$. $\$18. \times 373\frac{1}{3} \div 1000 = \6.72 .

302. A certain rectangular field is 240 rods long and 80 rods wide; what is the distance between the diagonally opposite corners?

Ans. $(240)^2 + (80)^2 = 64000$. $\sqrt{64000} = 252.98$.

303. What is the cost of 35 planks each 16 feet long, 8 inches wide, $2\frac{1}{2}$ inches thick at \$23.75 per thousand feet, board measure?

Ans. $35 \times 16 \times \frac{2}{3} \times \frac{5}{2} = \frac{2800}{3}$; $\frac{2800}{3} \div 1000 \times \$23.75 = \$22.16\frac{2}{3}$.

304. If a man is received at the jail on February 16, 1906 to serve a sentence of 60 days, when does his sentence expire?

Ans. April 16.

305. What is the value of a stick of timber 24 feet long, the larger end being 15 inches square and the lesser end 6 inches square, at 28 cents a cubic foot?

Ans. \$4.76.

306. Give the steps in the process of reducing 27 lb. 9 oz. avoirdupois weight to pounds Troy.

Ans. 27 lb. 9 oz. = $27\frac{9}{16}$ lbs.; 7000 gr. = 1 lb. avoirdupois; 5760 gr. = 1 lb. Troy; $7000 \times 27\frac{9}{16} = 189437\frac{1}{2}$; $189437.5 \div 5760 = 32.38$.

307. A pole 153 ft. long, standing 10 ft. in the ground, breaks off even with the surface of the ground; the falling part is broken into two pieces; $\frac{1}{9}$ of the longer piece equals the length of the shorter. Find the length of each piece.

Ans. 99 feet; 44 feet.

308. What will it cost to carpet a room 18 feet by 22 feet with carpet a yard wide at 90 cents per yard?

Ans. $(18 \times 22 \div 9) \times .90 = \39.60 .

309. If a rectangular room be 26 ft. 8 in. long, and 16 ft. broad, what must be its height in order that the area of the walls may be equal to that of the floor and ceiling?

Ans. $26\frac{2}{3} \times 16 \times 2 = 853\frac{1}{3}$ floor and ceiling; $(26\frac{2}{3} \times 1 \times 2) + (16 \times 1 \times 2) = 85\frac{1}{3}$ walls; $853\frac{1}{3} \div 83\frac{1}{3} = 10$.

310. What will it cost to construct a railroad 8 miles, 65 rods, 4 yards long, at \$15600 a mile?

Ans. $\frac{4}{5\frac{1}{2}} = 4 \times \frac{2}{11} = \frac{8}{11}$ rds.
 $\frac{65\frac{5}{11}}{320} = \frac{723}{11} \times \frac{1}{320} = \frac{723}{3520}$.
 $\$15600 \times 8 \frac{723}{3520} = \125120.42 .

311. A man had a yard 38 feet long and 27 feet wide; he reserved two grass plots, each 8 feet square, and had the rest paved with stone, at 45 cents a square yard; what did the paving cost?

Ans. $(38 \times 27) - (8 \times 8 \times 2) \div 9 \times .45 = \44.90 .

312. A wall 20' long, 6' high and 12" thick is built of brick; there are 22 common bricks in a cubic foot of masonry. Find the cost of the bricks @ \$11 per M.

$$\text{Ans. } \frac{\$11. \times 22 \times 6 \times 1 \times 20}{1000} = \$29.04.$$

313. 9 gal. 3 qt. is what decimal part of 3 bbl.? (Correct to four places.)

$$\text{Ans. } \frac{9 \text{ gal. } 3 \text{ qt.}}{3 \text{ bbl.}} = \frac{39 \text{ qt.}}{378 \text{ qt.}} = .1031.$$

314. Find the cost of *four* sticks of timber, each 8 inches by 10 inches and 30 feet long, at \$15 a 1000 feet board measure.

$$\text{Ans. } 4 \times 8 \times \frac{1}{8} \times 30 = 800. \quad \$15 \times 800 \div 1000 = \$12.$$

315. How many pounds of tin in 400 pounds of gun-metal composed of one part tin and $5\frac{3}{4}$ parts copper?

$$\text{Ans. } \frac{\text{tin } 1}{\text{both } 1 + 5\frac{3}{4}} = \frac{1}{7} = \frac{4}{27} = \text{tin}; \quad \frac{4}{27} \times \frac{400}{1} = 59\frac{16}{27}.$$

316. Find the cost of $\frac{5}{8}$ of an acre of land at 20c. per square foot.

$$\text{Ans. } \frac{5}{8} \text{ of } 160 = 100 \text{ sq. yds. } 100 \times 30.25 \times 9 = 27225 \text{ sq. ft. } \$20 \times 27225 = 5445.$$

317. A piece of cloth when measured by a yard measure which is $\frac{1}{2}$ inch too short appears to be 78 yards long; what is its true length?

$$\text{Ans. } \frac{36 - \frac{1}{2}}{36} = \frac{71}{72}, \quad \frac{71}{72} \times \frac{78}{1} = 76\frac{11}{12}.$$

318. To make a certain grade of concrete, there are used 2 parts of lime, 1 of cement and 6 of gravel.

How many cu. ft. of each are needed in building a wall 36' x 9' x 1½'?

Ans. $2 + 1 + 6 = 9$ parts. $36 \times 9 \times \frac{3}{2} \div 9 = 54$ cement. $54 \times 2 = 108$ lime. $54 \times 6 = 324$ gravel.

319. The diagonal of a square is 20 ft.; find the two decimal places the length of one side.

Ans. $(20)^2 = 400$, $400 \div 2 = 200$. $\sqrt{200} = 14.14$ ft.

320. Reduce 7 cwt. 28 lb. 4 oz. to the decimal of a ton.

Ans. 7 cwt. 28 lb. 4 oz. = $728\frac{1}{4}$ lb. $728.5 \div 2000 = .364125$.

321. Find the value of a piece of land 168 rods, 3 yds., 2 ft., 6 inches long by 40 rods, 1 yd., 1 ft. wide at \$80 per acre.

$$\begin{aligned} \text{Ans. } \frac{3\frac{5}{6} \text{ yds.}}{5\frac{1}{2}} &= \frac{23}{6} \times \frac{2}{11} = \frac{23}{33}; \\ \frac{1\frac{1}{3}}{5\frac{1}{2}} &= \frac{4}{3} \times \frac{2}{11} = \frac{8}{33}; \\ \$80 \times 168 \frac{23}{33} \times 40 \frac{8}{33} &= \$3389.79. \end{aligned}$$

322. Reduce (a) .64325 T, to integers of lower denominations; (b) 2 ft. 7¼ in. to the fraction of a rod.

$$\text{Ans. (a) 12 cwt. 86 lbs. 8 oz. (b) } \frac{53}{330} \text{ rds.}$$

323. Find the value of two-fifths of 300 A. 45 sq. rd. of land at \$57.25 per acre.

Ans. $300 \text{ A. } 45 \text{ sq. rd.} \times \frac{2}{5} = 120 \text{ A. } 18 \text{ sq. rd.}$
 $\$57.25 \times 120 \div_{100} = \$6876.44.$

324. Reduce (a) 2 yr. 8 mo. 21 da. to years and decimals of a year; (b) .09625 bbl. to integers of lower denominations.

$$\text{Ans. (a) } \frac{2 \text{ yr. } 8 \text{ mo. } 21 \text{ da.}}{1 \text{ yr.}} = \frac{991}{365} = 2.715 \text{ yrs.}$$

$$(b) \frac{3 \text{ gals.}}{100} \text{ gills.}$$

325. A uniform thickness of earth of twenty inches is removed from a street $\frac{1}{4}$ mile long and 4 rods wide. Find the cost of removal at \$1.12 $\frac{1}{2}$ a cubic yard.

$$\text{Ans. } 1,760 \times \frac{1}{4} \times (4 \times 5\frac{1}{2}) \times (20 \div 36) \times 1.125 = \$6,050.$$

326. A cistern has vertical sides and is 8 feet square. How deep must it be filled to hold 200 bbls. of water, if one barrel equals 31.5 gallons and one gallon equals 231 cubic inches?

$$\text{Ans. } 31.5 \times 200 \times 231 = 1455300 \text{ cubic inches water; } 8 \text{ ft.} = 96 \text{ in.; } 1 \times 96 \times 96 = 9216 \text{ cubic inches in one inch deep; } 1455300 \div 9216 = 157 +; 158 \text{ in.} = 13 \text{ ft. } 2 \text{ in.}$$

327. A wood rack 12 feet long and 3 ft. 2 in. wide must be how high to contain one cord of four-foot wood?

$$\text{Ans. } 128 \div 12 \times 3\frac{1}{6} = 3\frac{1}{3}.$$

328. At \$22 per M what will be the cost of 4 sticks of timber each 10" by 12" and 16' long?

$$\text{Ans. } 10 \times 1 \times 16 = 160 \times 4 = 640; \$22 \times 640 \div 1000 = \$14.08.$$

329. Find the cost of digging a cellar 48' x 36' and 7 $\frac{1}{2}$ ' deep at 30 cents a cubic yard.

$$\text{Ans. } \$30 \times 48 \times 36 \times 7\frac{1}{2} \div 27 = \$144.$$

330. A peddler bought a piece of linen measuring 60% yds. at 22 cents per yard. Being soiled it was washed when it shrunk and measured 59% yds. At what price per yard must it be sold that he gain 10% on the whole piece?

$$\text{Ans. } \$22 \times 60\% \times (1.00 + .10) = \$14.67125; \$14.67125 \div 59\% = \$24.634 \text{ or } \$25.$$

331. What will it cost to dig a trench $1\frac{1}{2}$ rods long, 5 yards wide and 8 feet deep, at 32 cents per cubic yard?

$$\begin{aligned} \text{Ans. } \frac{3}{2} \times \frac{11}{2} &= \frac{33}{4} \text{ yd.}; 8 \div 3 = \frac{8}{3} \text{ yd.}; \frac{33}{4} \times \\ &\frac{8}{3} \times 5 = 110 \text{ cu. yd. } \$32 \times 110 = \$35.20. \end{aligned}$$

332. A rectangular field is 40 rods, 2 yds. 15 ft. long and one-half as wide as long. What will it cost to put a fence of three rows of barbed wire around it, if the wire costs $\frac{2}{3}$ cents a yard?

Ans. $3 \times 40 \text{ rd. } 2 \text{ yd. } 15 \text{ ft.} = 667.5 \text{ ft.}$ 1 = width.
2 = length. $1 + 2 = 3$ perimeter. $\$.00\frac{2}{3} \times 667.5 \times 3 = \$13.35.$

333. How much will it cost to make an excavation 40 feet long, 30 feet wide, and 9 feet deep, at 32 cents per cubic yard?

$$\text{Ans. } \$32 \times \frac{40 \times 30 \times 9}{27} = \$128.$$

334. At \$2.25 per yd., find the cost of carpeting a room 24' by 18' with carpet $\frac{3}{4}$ yd. wide, if the breadths run lengthwise and $\frac{2}{3}$ yds. are allowed for matching.

Ans. $24' = 8 \text{ yds. } 18' = 6 \text{ yds. } 6 \div \frac{3}{4} = 8 \text{ strips,}$
 $8 \times 8 + \frac{2}{3} = 64\frac{2}{3} \text{ yds. } \$2.25 \times 64\frac{2}{3} = \$145.50.$

335. At \$16 per M. board measure find the cost of 20 plank 2 in. by 8 in., 18 ft. long and 30 plank $1\frac{1}{2}$ in. by 6 in., 10 ft. long.

Ans. $20 \times 2 \times \frac{2}{3} \times 18 = 480. 30 \times \frac{3}{2} \times \frac{1}{2} \times 10 = 225. \$16. \times (480 + 225) \div 1000 = \$11.28.$

336. Find the area of a circle whose diameter is 3 feet.

Ans. $1\frac{1}{2} \text{ ft.} = \text{radius. } 3.1416 \times \frac{3}{2} \times \frac{3}{2} = 7.0686 \text{ ft.}$

337. Make a receipted bill of the following, showing the cost of each item and the total cost.

John Mann sold this day to James Rice 1350 ft. pine at \$32.50 per M; 6240 ft. hemlock at \$24.50 per M; 3650 cedar posts at \$9.50 per C; and 4260 pounds of coal at \$7.25 per ton.

Ans.

March 1, 1907.

Mr. James Rice,

To JOHN MANN, Dr.

1350 ft. pine.....	@ \$32.50 per M.	\$43.87½
6240 ft. hemlock	@ \$24.50 per M.	152.88
3650 cedar posts.....	@ \$9.50 per C.	346.75
4260 lbs. coal.....	@ \$7.25 per ton.	15.44¼

\$558.95

Received Payment,

JOHN MANN.

338. A lot which was 53 feet wide and 150 feet long sold for \$8,347.50 which was one-fourth more than it cost. What was the cost per square foot?

Ans. $\$8347.50 \times \frac{4}{5} = \6678 ; $\$6678. \div 150 \times 52 = \84 .

339. Bell metal consists of 4 parts of copper to 1 part of tin. What is the cost of the metal of a bell weighing 6200 pounds if copper is worth 12 cents a pound and tin 20½ cents a pound?

Ans. $6200 \div (1 + 4) = 1240$ lb. tin. $1240 \times 4 = 4960$ lb. copper. $\$.205 \times 1240 = \254.20 . $\$.12 \times 4960 = \595.20 . $\$595.20 + \$254.20 = \$849.40$.

340. Reduce 7 cwt. 28 lb. 4 oz. to the decimal of a ton.

Ans. 7 cwt. 28 lb. 4 oz. = 11652 oz. 1 T. = 32000 oz. $116520 \div 32000 = .364125$.

E. Accounting and Review.

341. An agent buying wheat was offered a commission of 4c. per bushel, or one of 4½%, and he

chose the former. The average price paid is 89c. a bushel. Does he gain or lose by his choice, and how much on 249,600 bushels?

Ans. $\$.89 \times 249600 \cancel{\times .045} = \9996.58 ; $249600 \times .04 = \$9984$. $\$9996.58 \cancel{-} \$9984 = \$12.58$ loss.

342. Find the sum of \$24,615; \$394.50; \$6897.15 and \$9864.47 and subtract the sum from one hundred thousand dollars.

Ans. \$58228.88.

343. Make a receipted bill of the following items sold by you to S. Roberts, June 13, 1904: 10 lbs. sugar @ $6\frac{3}{4}$ c.; 25 lbs. meal @ 2c.; 5 lbs. coffee @ 38c.; 2 lbs. tea @ 60c.; 5 bars soap @ 6c.

Ans.
Mr. S. Roberts,

To WILLIAM JONES, Dr.

June 13.	10 lbs. sugar.....	@ $6\frac{3}{4}$ c.	\$0.67 $\frac{1}{2}$
	25 lbs. meal.....	@ 2 c.	.50
	5 lbs. coffee.....	@ 38 c.	1.90
	2 lbs. tea.....	@ 60 c.	1.20
	5 bars soap.....	@ 6 c.	.30

\$4.58

Received Payment.

WILLIAM JONES.

344. Multiply nine and thirty-six ten-thousandths by one and seventeen hundredths, to the product add nineteen and eight-tenths, and divide the sum by three hundred ninety-six millionths. (Correct to two decimal places.)

Ans. $9.0036 \times 1.17 = 10.534212$;
 10.534212×19.8

 $= 76601.52$.
.000396

345. Perform the operations indicated: (a) 396.4 times 8.743; (b) 29 less 7.0645; (c) 9734 divided by .95.

Ans. (a) 3465.7252; (b) 21.9355; (c) 102.46.

346. Express in words: 9087065043201.000240608.

Ans. Nine trillion, eighty-seven billion, sixty-five million, forty-three thousand, two hundred one and two hundred forty thousand, six hundred eight billionths.

347. What number divided by 847 will give a quotient at 30.7 with a remainder of 9?

Ans. $847 \times 30.7 + 9 = 26003.8$.

348. Write in arabic notation (a) three hundred and twenty-four ten-thousandths; (b) two hundred three sixty-fifths; (c) a number containing three units of the sixth integral order, one of the fifth, seven of the second, and eight of the third order of decimals.

Ans. (a) .0324, (b) $\frac{203}{65}$, (c) 310070.008.

349. A coal dealer's bill for 15,280 pounds of coal was 43.50. Find the price per ton.

Ans. $\$43.50 \div (15280 \div 2000) = \5.69 .

350. Multiply 2,107.5 by 1,253.7, and find the sum of the first, third and fifth partial products.

Ans. $147525 + 105375 + 21075 = 273975$.

351. Divide 29.58132 by 5.769803 and multiply the quotient by 46.8795. Find the result correct to *three* places of decimals, using the contracted method in each case.

Ans. $29.58132 \div 5.769803 \times 46.8795 = 240.304$.

352. August 29, 1902, Smith, Jones & Company, New York, sold to John Doolittle, Utica, the goods named below. Make an itemized bill.

20 tubs creamery butter, 50 lbs. each @ 19c.

15 bbls. flour @ \$3.45.

15 tubs prime lard, 60 lbs. each, @ 10.7c.

750 lbs. state cheese @ 10 $\frac{3}{4}$ c.

700 lbs. granulated sugar @ 4.41c.

Ans.

New York, August 29, 1902.

Mr. John Doolittle.

To SMITH, JONES & C., Dr.

20 tubs creamery butter, 50 lbs. each,	@ 19	c.	\$190.00
15 bbls. flour	@ 3.45		51.75
15 tubs prime lard, 60 lbs. each...	@ 10.7	c.	96.30
750 lbs. state cheese.....	@ 10 $\frac{3}{8}$	c.	77.81
700 lbs. granulated sugar	@ 4.41	c.	30.87
			<hr/> \$446.73

353. Make a receipted bill of the following: John Drew bought of Taylor & Co. January 3, 1901, 25 plank 10 feet long, 8 inches wide and 1½ inches thick, at \$16 per M; January 17, 12 sticks of timber 28 feet long and 8 inches square, at \$30 per M.

Ans.

January 3, 1901.

Mr. John Drew,

To TAYLOR & CO., Dr.

Jan. 3.	25 plank, 10 × $\frac{3}{8}$ × $\frac{3}{2}$	@ \$16 M.	\$4.00
17.	12 timbers, 28 × $\frac{3}{8}$ × 8.....	@ \$30 M.	53.76
			<hr/> \$57.76

Received Payment,
TAYLOR & CO.

354. Reduce to a common fraction .3525.

$$\text{Ans. } .3525 = \frac{3525}{10000} = \frac{141}{400}.$$

355. Multiply 65.15 by 3.14159 and divide the result by 57.296, finding a result correct to *three* decimal places.

$$\text{Ans. } 65.15 \times 3.14159 \div 57.296 = 3.572.$$

356. At \$22 per M, find the cost of 20 joists, each 4"×6" and 16' long.

$$\text{Ans. } 20 \times 4 \times \frac{1}{2} \times 16 \div 1000 \times 22 = \$14.08.$$

357. Multiply .0001 by 6030.0002.

$$\text{Ans. } .60300002.$$

358. What is the value of 8 pieces of cloth, each containing $35\frac{1}{3}$ yards at \$3.83 per yard?

Ans. $\$3.83 \times 35\frac{1}{3} \times 8 = \$1082.61\frac{1}{3}$.

359. A grocer bought 102 pounds of sugar at $4\frac{1}{2}$ c. a pound; he sold one-half the sugar at 5c. a pound, and one-third of it at $6\frac{1}{2}$ c. and the rest at cost. Find his whole gain.

Ans. $\$.05 \times 51 = \2.55 ; $\$.065 \times 34 = \2.21 ;
 $\$.045 \times 17 = \$.765$. $\$2.55 + \$2.21 + \$.765 - \$.045 \times 102 = \$.935$.

360. Perform the operations indicated and add the results of: $\frac{3}{4}$ 6948; 90000 less 8640.03; 74347 divided by .97.

Ans. 173217.36.

361. Find the total cost of $8\frac{1}{2}$ reams of paper at \$3.62 $\frac{1}{2}$ a ream; 200 pens at 90c. a gross, and 897 blank books at \$1.75 a dozen.

Ans. $\$3.625 \times 8.5 = \30.8125 ; $\$.90 \times 200 \div 144 = \1.25 ; $\$1.75 \times 897 \div 12 = \130.8125 .

362. At $4\frac{1}{2}$ cents a foot what will be the cost of a molding extending entirely around a room $15\frac{2}{3}$ feet long by $12\frac{3}{4}$ feet wide?

Ans. $(15\frac{2}{3} \times 2 + 12\frac{3}{4} \times 2) \times .04\frac{1}{2} = \$2.55\frac{1}{4}$.

363. Which is cheaper and how much per ton, to buy coal at 38c. per 100 pounds or \$7 a ton?

Ans. $\$.38 \times 2000 \div 100 = \7.60 ; $\$7.60 - \$7. = \$.60$.

364. If a man's salary is \$3,000 a year and he spends \$7.75 a day, how much can he save in a year?

Ans. $\$3000 - \$7.75 \times 365 = \$171.25$.

365. Find the total cost of 1,770 blank books at \$1.60 a dozen, 2,558 lbs. of paper at \$1,457.50 a ton, and $2\frac{1}{2}$ hundred weight of cotton twine at $18\frac{1}{2}$ cents a pound.

Ans. $\$1.60 \times 1770 \div 12 = \236 ; $\$1457.50 \times 2558 \div 2000 = \1865.42 ; $\$.18\frac{1}{2} \times 2\frac{1}{2} \times 100 = \46.25 . $\$236 + \$1865.42 + \$46.25 = \2147.67 .

366. A certain street railway employs 12 conductors at $\$1.57\frac{1}{2}$ a day, 12 motormen at the same wages. 9 watchmen at $\$1.35$ a day, 10 roadmen at $\$1.25$ a day. and 7 electricians at $\$1.50$ a day. Find the average daily wages of these employees.

Ans. $\$1.575 \times 12 = \18.90
 $\$1.575 \times 12 = \18.90
 $\$1.35 \times 9 = \12.15
 $\$1.25 \times 10 = \12.50
 $\$1.50 \times 7 = \10.50

$\$72.95$ total wages.

$12 + 12 + 9 + 10 + 7 = 50$ total workmen.
 $\$72.95 \div 50 = \1.459 .

367. Perform the operations indicated and add the results, make the answer correct to four decimal places: 1 divided by .0075; 876 less 49.0735; 8406 times .3094.

Ans. $1 \div .0075 = 133.3333$; $876 - 49.0735 = 826.9265$; $.3094 \times 8406 = 2600.8164$.

Sum of results = 3561.0762.

368. At the rate of $\$20$ a week (not including Sundays) how much should be received for $4\frac{1}{2}$ days work?

Ans. $\$20 \div 6 \times 4\frac{1}{2} = \15

369. A man receives $\$32$ a month and board for eight months in a year, the rest of the year he is idle and pays $\$14$ a month for board. If his other expenses amount to $\$65$ a year, how much can he save in 9 years.

Ans. $(\$32 \times 8 - \$14 \times 4 - \$65) \times 9 = \1215 .

370. A dealer bought 12 tons of coal at $\$4.50$ a ton, and retailed it at 35c. per hundred pounds; how much did he gain?

Ans. $\$4.50 \times 12 = \54 . $12 \times 20 \times .35 = \84 .
 $\$84 - \$54 = \$30$.

371. Out of \$150 a man pays bills of \$6.75, \$45.18, \$16.66 and \$9.87. How much will he have left?

Ans. \$150. — $(\$6.75 + \$45.18 + \$16.16 + \$9.87) = \$71.54$.

372. Find the total cost of 4325 pounds of coal at \$5.75 a ton, 6284 ft. of lumber at \$12.35 per thousand, and 3250 lath at $18\frac{1}{2}$ cents per hundred.

Ans. $\$5.75 \times 4325 \div 2000 = \12.15 ; $\$12.35 \times 6284 \div 1000 = \77.61 ; $\$.185 \times 3250 \div 100 = \6.012 . Their sum = \$95.77.

373. Multiply 8.497 by 31.69 and prove by division the correctness of your work.

Ans. $8.497 \times 31.69 = 269.26993$; $269.26993 \div 31.69 = 8.497$.

374. Find the total cost of 18 reams of paper at \$1.40 per ream, 4500 envelopes at \$3.75 per M, 6 doz. steel pens at 75 cents a gross, and 50 blank books at \$1.25 a dozen.

Ans. $\$1.40 \times 18 = \25.20 ; $\$3.75 \times 4500 \div 1000 = \16.875 ; $\$.75 \times 6 \div 12 = \$.375$; $\$1.25 \times 50 \div 12 = \5.20% . $\$25.20 + \$16.875 + \$.375 + \$5.20\% = \$47.65\%$.

375. Find the total cost of 6 barrels of flour at \$5.75 a barrel, 500 eggs at 18c. a dozen, 9 tubs of butter each weighing 24 pounds gross (the tubs alone weigh $3\frac{1}{2}$ pounds each) at 23c. a pound, and 148 pounds of cereal in 2 pound packages at 13c. a package.

Ans. $\$5.75 \times 6 = \34.50 ; $\$.18 \times 500 \div 12 = \7.60 ; $\$.23 \times (9 \times 24 - 9 \times 3\frac{1}{2}) = \$42.43\frac{1}{2}$; $\$.13 \times 148 \div 2 = \9.62 . $\$34.50 + \$7.60 + \$42.435 + \$9.62 = \$94.155$.

376. Multiply 4.1925 by 807.63. Prove that your answer is correct.

Ans. $4.1925 \times 807.63 = 3385.988775$. *Proof:* $3385.988775 \div 807.63 = 4.1925$.

377. When a man had spent \$4318 for a farm he had $\frac{3}{20}$ of his money left. How much money had he at first?

$$\text{Ans. } \$4318 = \frac{20}{20} - \frac{3}{20} = \frac{17}{20}; \frac{1}{20} = \$4318 \times \frac{1}{17} =$$

$$\frac{20}{20}; \frac{20}{20} = 20 \times \$254 = \$5080.$$

378. A merchant bought 16 barrels of flour at \$5.75 a barrel, 9 barrels at \$4.90, 14 barrels at \$6.16 and 29 barrels at \$5.78. Find the average cost per barrel.

$$\begin{array}{rcl} \text{Ans. } \$5.75 \times 16 & = & \$92.00 \\ \$4.90 \times 9 & = & \$44.10 \\ \$6.16 \times 14 & = & \$86.24 \\ \$5.78 \times 29 & = & \$167.62 \\ \hline & & \$389.96 \text{ total cost of flour.} \\ 16 + 9 + 14 + 29 & = & 68 \text{ number of bbls.} \\ \$389.96 \div 68 & = & \$5.749. \end{array}$$

379. The total cost of food supplies for patients in a hospital for one year is \$22,654.45, and the average daily number of patients is 321.9; what is the average daily cost per patient?

$$\text{Ans. } \frac{\$22654.45}{321.9 \times 365} = \$1.93.$$

380. Which is more and how much for one year, a salary of \$75 a month for twelve months, or wages at \$3.25 a day for 6 days each week, counting out of the 52 weeks in a year 3 weeks vacation and 8 holidays?

$$\text{Ans. } \$3.25 \times 6 \times 49 - \$3.25 \times 8 = \$929.50; \\ \$75 \times 12 = \$900; \$929.50 - \$900 = \$29.50.$$

381. Add the following numbers: 98764.375; 49862.05; 969847.0817; 496.9999; 869748; 698.49.

$$\text{Ans. } 1989416.9966.$$

382. A man earns \$87.50 a month and his necessary expenses are \$876 a year. How long will it take him to save enough to pay for a house worth \$2249?

$$\text{Ans. } \$87.50 \times 12 - \$876 = \$174; \$2249 \div 174 = 12.925.$$

383. A ton of coal lasts a family 14 days. If coal is worth \$6.30 a ton, what will their coal cost from Nov. 1 to Jan. 3, inclusive?

Ans. Nov. 1 to Jan. 3 = 63 days; $(63 \div 14) \times \$6.30 = \28.35 .

384. If a woman gives a \$10 bill in payment for goods amounting to \$7.06, how much change should she receive?

Ans. \$2.94.

385. A farmer sold four wagon loads of wheat weighing respectively 2873 pounds, 3027 pounds, 3960 pounds and 5360 pounds. A bushel of wheat weighs 60 pounds. At 95c. a bushel how much should he receive for the four loads?

Ans. $15220 \div 60 \times .95 = \$240.98\frac{1}{3}$.

386. Add the following numbers: 875,462; 49,736.47; 8,634.875; 99,862.0049; 2,697.08 and subtract from the sum sixty-nine thousand and seven millionths.

Ans. 967392.429893.

387. Add \$66,553.63, \$60,739.55, \$7,843.92, \$825,963.21, and from the sum subtract \$387,695.89.

Ans. $\$961100.31 - \$387695.89 = \$573404.42$.

388. A man earns \$2.75 a day and his necessary expenses are \$53 a month. How much can he save in a month having 26 working days?

Ans. $\$2.75 \times 26 - \$53 = \$18.50$.

389. How much change should be received from a ten-dollar bill after buying 3 quires of paper at 27 cents a quire, 100 pens at 9 cents a dozen, and 2 books at 75 cents each?

Ans. \$6.94.

390. In an orchard are 480 apple trees; the trees produce on an average $3\frac{1}{2}$ barrels of apples each. How much is the whole crop worth at $\$1\frac{1}{4}$ a barrel?

Ans. $480 \times 3\frac{1}{2} \times 1.25 = \$2100.$

391. If 296500 bricks cost \$2261.27, what is the price per thousand?

Ans. $\$2261.27 \div 296.56 = \$7.62.$

392. A man buys a farm of 196 acres for \$9300 and after spending \$392 for improvements he sells it at \$75 an acre, how much does he gain?

Ans. $\$75 \times 196 = \$14700; \$9800 + \$392 = \$10192;$
 $\$14700 - \$10192 = \$4508.$

393. A fruit dealer receives 2464 boxes of oranges, 1632 boxes of pineapples, 1942 boxes of lemons and 850 boxes of cocoanuts. How much must he pay for cartage at the rate of $3\frac{1}{2}c.$ for a dozen boxes?

Ans.
$$\frac{2464 + 1632 + 1942 + 850}{12} \times .035 = \$20.09.$$

394. A man having $356\frac{1}{2}$ acres of land sold $\frac{2}{3}$ of it at \$25 an acre; how much did he receive for it?

Ans. $\frac{2}{3}$ of $356\frac{1}{2} = 237\frac{2}{3}; \$25 \times 237\frac{2}{3} = \$5941\frac{2}{3}.$

395. A room is 14 feet wide and 17 feet long. What will be the cost of a moulding extending entirely around it at $6\frac{1}{2}$ cents a foot?

Ans. $2 \times 14 + 2 \times 17 = 62; 62 \times .065 = \$4.03.$

396. Add the following numbers: 46,817.25; 392.006; 78,956; 29,849.04263 and subtract the sum from five hundred thousand.

Ans. 156014.29863.

397. A building is assessed for \$548,256, which is $\frac{2}{3}$ of the market value. What is its market value?

Ans. $\$548256 \div \frac{2}{3} = \$822,384.$

398. Find the total cost of 30 eggs at 18 cents a dozen, 12 pounds of butter at $27\frac{1}{2}$ cents a pound and $5\frac{1}{4}$ pounds of cheese at 16 cents a pound?

Ans. $$.18 \times 30 \div 12 = $.45$; $$.275 \times 12 = \3.30 ;
 $$.16 \times 5\frac{1}{4} = $.84$. $$.45 + \$3.30 + $.84 = \$4.59$.

399. A man paid \$38.25 for clothes and found he had spent $\frac{3}{4}$ of his money. How much money had he at first?

Ans. $38.25 \div \frac{3}{4} = \51 .

400. Add 67845, 5601, 7832904, 392, 625.96 and 4783.5.

Ans. 7912151.46.

401. Find the total cost of 27 lbs. of pork at 14 cents per lb., 32 lbs. of beef at 16 cents, 13, lbs. of veal at 15 cents and 25 lbs. of ham at 13 cents.

Ans. $$.14 \times 27 = \3.78 ; $$.16 \times 32 = \5.12 ;
 $$.15 \times 13 = \1.95 ; $$.13 \times 25 = \3.25 . $\$3.78 + \$5.12 + \$1.95 + \$3.25 = \$14.10$.

402. Add the following: \$264871.42; \$39864.09; \$764972.88; \$624.98; \$397862.44; 87642.83 and subtract the sum from two million dollars.

Ans. \$444,161.36.

403. In a hospital having 1048 inmates there were consumed the following articles: Meat, fresh, 287,138 pounds, average price \$0.082; meat, smoked, 7,614 pounds, average price \$0.12; meat, canned, 7,239 pounds, average price \$0.066; poultry, 4,128 pounds, average price, \$0.167. Find the total cost and the per capita cost of these articles.

Ans. \$25626.146 total cost; \$24.452 cost per capita.

404. The total cost of 75.3 tons of coal was \$640.05: what was the average cost per ton?

Ans. $\$640.05 \div 75.3 = \8.50 .

405. A farmer sold 175 acres of land at \$67.50 an acre and received in payment a note for \$4875.69 and the rest in cash. How much cash did he receive?

Ans. $\$67.50 \times 175 - \$4875.69 = \$6936.81$.

Ans. $480 \times 3\frac{1}{2} \times 1.25 = \$2100.$

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Ans. $\$67.50 \times 175 - \$4875.69 = \$6936.81$.

406. By defective scales customers of a certain grocer received $15\frac{3}{4}$ oz. for a lb.; @ 6c. a lb. find the actual value of the sugar bought by customers who paid for 2 cwt. 28 lbs. 12 oz.

Ans. 2 cwt. 28 lb. 12 oz. = $228\frac{3}{4}$ lb.;

$$228\frac{3}{4} \times \frac{15\frac{3}{4}}{16} \times .06 = \$13.51.$$

Percentage, Discount, Interest.

407. If, after expending \$821.70 for improvements on a piece of real estate, I sell it for \$6,375, and thereby make a net gain of $11\frac{1}{2}\%$ on the cost, how much did I pay for it?

Ans. $(\$6375 - \$821.70) \div 11\frac{1}{2}\% = \$4997.97.$

408. Successive trade discounts of 15% and 10% from the list price of a piano amount to \$150.40. Find the net selling price.

Ans. \$1000 = assumed list price; \$235 = total discount; $\$150.40 \div .235 = 640$; $\$640 - \$150.40 = \$489.60.$

409. In 1890 the population of Buffalo was 255,664; in 1900 it had increased to 352,387. Find to two decimal places the per cent. of increase.

Ans. $(352387 - 255664) \div 255664 = .3783.$

410. A dealer paid \$450 for the insurance of a cargo of grain at $1\frac{1}{4}\%$. What was the amount of insurance?

Ans. $\$450 \div .0125 = \$36000.$

411. A bill of goods amounting to \$360 is subject to trade discounts of $12\frac{1}{2}\%$ and 8%. Find the net amount of the bill. Find a single discount equivalent to these two successive discounts.

Ans. $\$360 \times .87\frac{1}{2} \times .92 = \289.80 ; $100 - (.87\frac{1}{2} \times .92) = .19\frac{1}{2} = 19\frac{1}{2}\%.$

412. Twenty per cent of a barrel of oil leaked out. What per cent must be gained on the remainder that a gain of ten per cent may be realized on the cost of the oil?

Ans. $(100 + 10) - (100 - 20) = 30$; $30 \div 80 = .375 = 37\frac{1}{2}\%$.

413. A house worth \$7200 is insured for $\frac{3}{4}$ of its value at $1\frac{1}{4}\%$. What is the premium?

Ans. $\$7200 \times \frac{3}{4} \times .0125 = \67.50 .

414. If a marketman so adjusts his weights as to sell $15\frac{1}{2}$ ounces for a pound, a) what per cent does he take by fraud; b) how much is a man defrauded who pays a bill of 75?

Ans. $16 - 15\frac{1}{2} = \frac{1}{2}$; $\frac{1}{2} \div 16 = 03\frac{1}{8}\%$; $75 \times .03\frac{1}{8} = \$2.34\frac{3}{8}$.

415. Bought apples at \$1.75 a barrel and sold them at $\$2.37\frac{1}{2}$ a barrel; what did I gain per cent?

Ans. $(\$2.37\frac{1}{2} - \$1.75) \div 1.75 = .35\frac{5}{7}\%$.

416. A person failing in business owes \$10,800 and has property worth \$7,200; what will a creditor receive whose claim is \$180?

Ans. $7200 \div 10800 = .66\frac{2}{3}$; $180 \times .66\frac{2}{3} = \120 .

417. A boy spent $\frac{1}{3}$ of his money, lost $\frac{1}{4}$ of what he had left, and gave away $\frac{1}{6}$ of what still remained; he then had 50 cents. What had he at first?

Ans. $\frac{2}{3} - \frac{1}{3} = \frac{2}{3}$ remaining; $\frac{1}{4}$ of $\frac{2}{3} = \frac{1}{6}$; $\frac{1}{6} + \frac{1}{3} = \frac{1}{2}$; $\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$ remaining; $\frac{1}{6}$ of $\frac{1}{2} = \frac{1}{12}$; $\frac{1}{6} - \frac{1}{12} = \frac{1}{12}$ remaining; $.50 \div \frac{1}{12} = \1.20 .

418. Find the loss on 175 shares of stock bought and sold at par, brokerage in each case being $\frac{1}{8}\%$.

Ans. $100\frac{1}{8} - 99\frac{7}{8} = \frac{1}{4}$; $\$.25 \times 175 = \43.75 .

419. At what rate per cent must \$8320 be put at interest for 2 years 3 months 27 days to amount to \$9190.48?

Ans. $\$9190.48 - \$8320 = \$870.48$; interest on \$1 at 1% for 2 yrs. 3 mo. 27 d. = .02325; $.02325 \times \$8320 = \193.44 ; $\$870.48 \div \$193.44 = 4\frac{1}{2}\%$.

420. A man bought 580 bushels of grain @ 75c. a bushel and sold the whole amount for \$513.30; find his per cent of gain.

$$\text{Ans. } \$513.30 - (580 \times .75) \div 435 = 18\%.$$

421. If, by selling tea at $47\frac{1}{2}$ cents per pound, I lose 5%, at what price must I sell it to gain 15%:

$$\text{Ans. } (47\frac{1}{2} \div 95) \times 1.15 = \$57\frac{1}{2}.$$

422. A person buys 60 shares of railroad stock at $115\frac{1}{4}$. He receives a dividend of 6%. What rate per cent does he receive on his investment?

$$\text{Ans. } 6 \div 115\frac{1}{4} = .05206 = 5.206\%.$$

423. What amount must be invested in $4\frac{1}{2}\%$ bonds at $106\frac{1}{4}$ in order to produce an annual income of \$1470.33?

$$\text{Ans. } \$1470.33 \div .045 = 32674 \text{ shares; } \$106.25 \times 32674 = \$3471612.50.$$

424. A sum of money placed at simple interest amounted in 1 year and six months to \$2,687.50. If it had remained at the same rate of interest for six months longer it would have amounted to \$2,750. What was the rate of interest per annum?

$$\text{Ans. } (\$2750 - \$2687.50) \times 3 = \$187.50; \$2687.50 - \$187.50 = \$2500 \text{ Prin.; } \$62.50 \times 2 = \$125. \text{ Int. for 1 yr.; } \$125 \div 2500 = 5\%.$$

425. A certain sum of money at simple interest amounts to \$2070 in 6 months and to \$2420 in 3 years. What is the rate per cent?

$$\text{Ans. } (\$2420 - \$2070) \div 5 \times 2 = \$140; \$2070 - \$70 = \$2000 \text{ prin.; } \$140 \div 2000 = 7\%.$$

426. What is the difference on a bill of goods listed at \$425, between a single discount of 50% and two discounts of 30% and 20%?

$$\text{Ans. } (\$425 \times .50) - (425 \times .70 \times .80) = \$25.50.$$

427. If \$324 is paid for a piano at 40, 25 and 10% off, what is the list price?

Ans. $\$324 \div .90 = \360 ; $\$360 \div .75 = \480 ;
 $\$480 \div .60 = \800 .

428. The proceeds of a sale of stock at $127\frac{1}{2}$, brokerage $\frac{1}{8}\%$, are \$12,228; find the number of shares sold.

Ans. $127\frac{1}{2} + \frac{1}{8} = 127\frac{3}{8}$; $\$12228 \div 1.27\frac{3}{8} = \9600 .

429. What sum of money at $3\frac{1}{2}$ per cent simple interest will amount to \$54.05 in five years?

Ans. $3\frac{1}{2} \times 5 = 17\frac{1}{2}\% = .17\frac{1}{2}$; $54.05 \div (1.00 + .17\frac{1}{2}) = \42.62 .

430. Find the net proceeds of the sale, through a commission merchant, of 455 barrels of apples @ \$1.25 a barrel, the rate of commission being 4% and other charges being 14c. a barrel.

Ans. $\$1.25 \times 455 = \568.75 ; $568.75 \times .04 = \$22.75$;
 $455 \times .14 = \$63.70$; $\$63.70 + \$22.75 = \$86.45$;
 $\$568.75 - \$86.45 = \$482.30$.

431. A merchant buys through an agent 120 pounds of tea at 60 cents a pound and pays \$1.44 commission; find the rate of the agent's commission and the net cost of the tea to the merchant.

Ans. $\$.60 \times 120 = \72 ; $\$1.44 \div \$72 = 2\%$;
 $\$72 + \$1.44 = \$73.44$.

432. The face of a policy of insurance on a house was \$5,692; the premium paid was \$42.69. Find the rate of insurance.

Ans. $42.69 \div 5692 = .0075 = \frac{3}{4}\%$.

433. Find the proceeds of a note for \$350 given for three months, and discounted at an Albany, N. Y., bank the day it was made, at 5% per annum.

Ans. Term of discount = 3 mo.; $\frac{350 \times 90 \times 5}{360 \times 100} =$
 $\$4.37\frac{1}{2}$; $\$350 - 4.37\frac{1}{2} = 345.62\frac{1}{2}$.

434. What is the difference between a discount of 10% and two successive discounts of 5% on a bill of \$832?

Ans. $\$832 \times .10 = \83.20 ; $\$832 \times 5\% = \41.60 ;
 $832 - 41.60 = \$790.40$; $\$790.40 \times 5\% = \39.52 ;
 $\$41.60 + \$39.52 = \$81.12$; $\$83.20 - \$81.12 = \$2.08$.

435. A building valued at \$10,000 is insured at $\frac{5}{8}\%$ of its value at $\frac{2}{3}\%$ per cent per annum. What is the annual premium?

Ans. $\frac{5}{8}\%$ of \$10000 = \$6250; $6250 \times \frac{2}{3}\% = \$41.66\frac{2}{3}$.

436. How much better rate of income will be received from an investment in 6% stock at 137 $\frac{3}{4}\%$ than in 4% stock at 109 $\frac{1}{4}\%$, brokerage in each case being $\frac{1}{8}\%$.

Ans. $6 \div 1.375 = 4.3636$; $4 \div 1.10 = 3.6363$; Difference = .7273.

437. A town needs \$46375. The assessed valuation is \$12,500,000. Find the tax rate per thousand dollars.

Ans. $\$46,375 \div \$12,500,000 = .00371$; $\$1000 \times .00371 = \3.71 .

438. Two thousand one hundred and eighty dollars at simple interest for one year, four months and fifteen days amounted to \$2359.85. What was the rate per cent?

Ans. $\$2359.85 - \$2180 = \$179.85$; Time = 1 $\frac{3}{4}$ yrs.;
 $\$179.85 \div 1\frac{3}{4} = \130.80 ; $\$130.80 \div \$2180 = .06$.

439. A dealer paid \$620.44 for insurance on a house at 1 $\frac{1}{4}\%$. What was the amount of the insurance?

Ans. $\$620.44 \div .0125 = \49635.20 .

440. The total cost of maintaining a jail for a year of 365 days is \$22654.45. The average number of inmates is 91. Find the average cost per inmate for one day.

Ans. $\$22654.45 \div 365 \times 91 = \712 .

441. Find the cost of 36 shares of R., W. & O. R. R. stock at 126 $\frac{3}{4}$, brokerage $\frac{1}{8}$.

Ans. $(126\frac{3}{4} + \frac{1}{8}) \times 36 = \4567.50 .

442. How many pounds of sugar at $4\frac{3}{4}$ cents does an agent purchase, if his commission at $1\frac{1}{4}\%$ amounts to \$25?

Ans. $\$25. \div 1\frac{1}{4}\% = \2000 ; $\$2000 \div 4\frac{3}{4} = 421.053$.

443. A 90 day note without interest, dated December 10, 1902, yields \$458.92 proceeds when discounted at 6%; find the face of the note Jan. 19, 1903.

Ans. Matures Mar. 10, 1903; term of discount is from Jan. 19 to Mar. 10 = 50 days; int. on \$1 for 1 mo. 20 d. = $.008\frac{1}{3}$; $\$1.00 - \$0.008\frac{1}{3} = \$.991\frac{2}{3}$; $\$458.92 \div .991\frac{2}{3} = 467.77$.

444. What sum must be invested in Western Union stock at $94\frac{1}{4}$ paying $1\frac{1}{4}$ per cent quarterly dividends to yield an annual income of \$1,000?

Ans. $\$1000 \div (1\frac{1}{4} \times 4) = 200$ shares; $\$94.25 \times 200 = \18850 .

445. Find the simple interest on \$7500 for 2 yr. 4 mo. and 12 da. at 6%.

Ans. Int. on \$1 at 6% for 2 yr. 4 mo. 12 d. = \$.142; $$.142 \times \$7500 = \$1065$.

446. Find the simple interest on \$6950 for 3 yr. 5 mo. and 10 da. at 5%.

Ans. Int. on \$1 for time stated = .17225; $\$6950 \times .17225 = \$119.61\frac{1}{8}$.

447. The assessed valuation of a certain school district is \$123,900, upon which a tax amounting to \$198.24 must be raised. What is the tax on a farm assessed at \$1,480?

Ans. $\$198.24 \div \$123.90 = .0016$; $\$1480 \times .0016 = \$2.36\frac{2}{5}$.

448. An insolvent merchant's assets are \$3,027.90 and his liabilities \$4,974. How much ought a creditor to receive whose bill against the merchant is \$627.

Ans. $(\$3027.90 \div \$4974) \times \$627 = \381.68 .

449. A man sold 28 yards of cloth at \$1.25 a yard thereby gaining \$3.50; find the rate per cent of gain.

Ans. $\$3.50 \div (\$1.25 \times 28 - 3.50) = 11\frac{1}{2}\%$.

450. The cost of a new school house was \$3,800. What was the rate of the tax on \$100, the valuation of the district being \$325,000?

Ans. $\$100 \times (\$3800 \div \$325,000) = \$1.1688 +$

451. The cost of insuring a cargo for \$8,500 is \$63.75. What is the value of a cargo that cost \$375 to insure at the same rate?

Ans. $\$375 \div (\$63.75 \div \$8500) = \$50,000.$

452. A merchant sends his agent \$3,138.66 which includes the agent's commission of 6% and the amount to be invested; how many pounds of cotton can be bought @ 9c. a pound?

Ans. $\$3138.66 \div 1.06 = \$2961; \$2961 \div .09 = 32900.$

453. If an investor buys \$3,000 of U. S. 4's having 16 years to run, at $115\frac{1}{2}$, and holds them until their maturity, how much will be his average net annual income from the investment?

Ans. $90.93\frac{3}{4}.$

454. If a dealer buy 1570 tons of coal at $4.87\frac{1}{2}$ a ton and sell at an advance of 15 per cent, how much does he gain?

Ans. $\$4.87\frac{1}{2} \times 1570 \times .15 = \$1148.06\frac{1}{4}.$

455. A man paid a certain amount for a cow, 3 times as much for a horse and $\frac{3}{4}$ as much for a harness; had he paid 10% less for the cow, 10% more for the horse and 20% more for the harness, he would have paid \$204 for all. How much did he pay for each?

Ans. \$40 cost of cow; \$120 cost of horse; \$30 cost of harness.

456. Find the simple interest on \$4836 for 2 yr. 7 mo. at 4%.

Ans. Interest on \$1 for time stated = $.103\frac{1}{3}$; $\$4836 \times .103\frac{1}{3} = \$499.72.$

457. What is the interest on a U. S. bond of \$1,000 bearing $3\frac{1}{2}\%$ interest, from May 1st to July 19th?

Ans. Int. on \$1 for time stated = .0075; $\$1000 \times .0075 = \7.50 .

457a. A dealer paid \$38.40 for insurance on a house at $1\frac{1}{2}\%$. What was the amount of insurance?

Ans. $\$38.40 \div .015 = \2560 .

458. What is the annual premium on a life policy of \$7425 at \$27.50 per \$1000?

Ans. $\$7425 \div 1000 = \7.425 ; $\$27.50 \times 7.425 = \$204.18\frac{3}{4}$.

459. A broker sold 500 shares of R. W. & O. R. R. stock at 123, brokerage $\frac{1}{8}$, invested the proceeds in D. & H. R. R. stock at 112, brokerage $\frac{1}{8}$, and sent his customer a draft for the uninvested balance. Find the amount of the draft.

Ans. $(122\frac{7}{8} \times 500) \div 112\frac{1}{8} = 547$ shares; unexpended balance $\$105.12\frac{1}{2}$.

460. The net cost of a bill of goods sold subject to trade discounts of 20% and 10% was \$306. Find the cost at list price.

Ans. \$425.

461. Write a negotiable promissory note, without interest, for \$156.50, dated to-day and payable in 60 days at the First National Bank; make J. Towne the payee and yourself the maker of the note.

Ans.
\$156.50.

Albany, N. Y., Feb. 25, 1907.

Sixty days after date, I promise to pay to J. Towne, or order, One Hundred Fifty-six $\frac{50}{100}$ Dollars, at the First National Bank. Value received.

JOHN BROWN.

462. Find the interest on \$387.84 from September 18, 1890, to April 3, 1892, at 8 per cent.

Ans. \$47.8336.

463. Three bbls. 18 gals. is what per cent of 10 bbls.?

Ans. $35 + \%$.

464. A merchant buys cloth at \$1.20 a yard and marks it so as to sell it at a discount of 20% from the list price and still gain 20%; find the list price of the goods.

Ans. \$1.80.

465. Find the cost of a draft on Albany for \$5,100, due 60 days after sight, if exchange is at $1\frac{3}{4}\%$ premium and money is worth 5%.

Ans. \$5146.75.

466. What income will a man receive from an investment of \$20,171.25 in 5% stock at $122\frac{1}{8}\%$, brokerage $\frac{1}{8}\%$.

Ans. \$825.

467. If the cost of erecting a \$37,700 building is assessed upon \$325,000 capital stock, what must a stockholder pay who owns 100 shares of \$100 each?

Ans. $\$37,700 \div 325000 = 11\frac{3}{8}\%$ rate; $\$100 \times 100 \times 11\frac{3}{8}\% = \1160 .

468. A store was insured for \$12,000 at the rate of $\frac{3}{4}\%$ per cent., and the goods for \$15,000 at $1\frac{1}{4}\%$ per cent.; what was the entire premium?

Ans. $\$12,000 \times \frac{3}{4}\% = \90 .; $\$15,000 \times 1\frac{1}{4}\% = \187.50 ; $\$90. + \$187.50 = \$277.50$.

469. I sell goods at a discount of 10% from the marked price, and still make a profit of 8%; how many per cent. above cost was the marked price?

Ans. 90% of the marked price = 108%; $1.08 \div 90 = 1.20$ marked price; $1.20 - 1.00 = 20\%$.

470. A city lot sold for \$1,260, which was an advance of 12% on its cost. Find the cost.

Ans. $\$1260 \div (1.00 + .12) = \1125 .

471. A man bought 65 cans of milk, each containing 20 gallons, at \$2.50 a can; he retailed it at 7c. a quart; find his gain on the whole.

Ans. $\$2.50 \times 65 = \162.50 cost; $20 \times 65 \times 4 \times .07 = \$340.$ selling price; $\$340 - \$162.50 = \$177.50$ gain.

472. A grocer sold tea for $87\frac{1}{2}$ c. a pound, thus gaining $12\frac{1}{2}$ c. a pound; find his per cent of gain.

Ans. $\$.87\frac{1}{2} - \$.12\frac{1}{2} = \$.75$; $\$.12\frac{1}{2} \div \$.75 = .16\frac{2}{3} = 16\frac{2}{3}\%$.

473. On January 3, 1905, a merchant took a 90 day note and discounted it at 5% at a Buffalo bank the same day, receiving \$1,975. For what sum was the note given?

Ans. $(90 \times .05) \div 360 = .0125$; $\$1975 \div (1.00 - .0125) = \$2000.$

474. What is the true discount on \$120 for 120 days, at 7%? (Consider 360 days = 1 year.)

Ans. $(120 \times .07) \div 360 = .02\frac{1}{3}$; $\$120 \div (1.00 + .02\frac{1}{3}) = \114 ; $\$120 - \$114 = \$6.$

475. How many barrels of flour, at \$5 a barrel, can be bought for \$1,734, after deducting a commission of 2% for buying?

Ans. $\$1734 \div (1.00 + .02) = \1700 ; $\$1700 \div 5 = 340.$

476. A commission merchant sold 600 baskets of grapes at $12\frac{3}{4}$ cents per basket, and after deducting \$18.70 for transportation charges and commission at 6%, remitted the balance to the consignor. Find the amount.

Ans. $\$.12\frac{3}{4} \times 600 = \76.50 ; $\$76.50 \times .06 = \4.59 ; $\$4.59 + \$18.70 = \$23.29$; $\$76.50 - \$23.29 = \$53.21.$

477. How much better rate of income will be received from an investment in 6% stock at $137\frac{3}{8}$ than in 4% stock at $109\frac{7}{8}$, brokerage in each case being $\frac{1}{8}\%$.

Ans. $\$6 \div (137\frac{7}{8} + \frac{1}{8}) = .04\frac{4}{11} = 4\frac{4}{11}\%$; $\$4 \div (109\frac{7}{8} + \frac{1}{8}) = .03\frac{7}{11} = 3\frac{7}{11}\%$; $4\frac{4}{11} - 3\frac{7}{11} = \frac{7}{11} = \frac{7}{11}\%$.

478. Find the net cost of a piano marked \$450 with trade discounts of 3, 8 and 10%.

Ans. $.97 \times .92 \times .90 = .803160$; $\$450 \times .80316 = \361.422 .

479. A man invested equal sums of money for 1 year, 3 months, 18 days, the first at 5% per cent per annum, the second at 7% per annum, and received \$14.04 more interest on the second investment than on the first. Find the sums invested.

Ans. $7\% - 5\% = 2\%$; $\$14.04 \div 2 = \7.02 int. at 1%; rate at 7% = .091; rate at 5% = .065; $\$702 \times .07 = \49.14 ; $702 \times .05 = \$35.10$; $\$49.14 \div .091 = 540$; $\$35.10 \div .065 = \540 .

480. Find the bank discount of a note for \$3,150, without interest, drawn May 7, 1904 at 6 months, and discounted the day it is made at 7%.

Ans. Note matures Nov. 7, 1904; term of discount
 $\$3150 \times 184 \times 7$
 $= 184 \text{ days. } \frac{\quad}{360 \times 100} = \112.70 .

481. A house valued at \$8750 is insured for $\frac{3}{4}$ of its value at $1\frac{1}{8}\%$. What is the premium?

Ans. $\frac{3}{4}$ of \$8750 = \$6562.50; $\$6562.50 \times 1\frac{1}{8} = \73.83 .

482. My broker bought for me 26 shares of stock at 107 and sold them at $118\frac{7}{8}$, brokerage in each case $\frac{1}{8}\%$; find my gain.

Ans. \$302.25.

483. A wholesale dealer sells to a tradesman on account at 20 per cent. profit; the tradesman fails in business and pays 25 cents on a dollar. What is the per cent. of loss to the dealer on the cost of his goods?

Ans. $120\% \times .25 = 30\%$; $100\% - 30\% = 70\%$.

484. By selling a horse at $4\frac{1}{2}\%$ profit a gain of \$21 is made; find the cost and the selling price.

Ans. $\$21 = 4\frac{1}{2}\%$; $\$21 \div 4\frac{1}{2} = \$4.50 = 1\%$;
 $\$4.50 \times 100 = \450 cost. $\$450 + \$21 = \$471$ selling price.

485. A wagon was sold for \$329, which was $16\frac{2}{3}\%$ more than it cost; what did it cost?

Ans. $\$329 = \frac{7}{6}$ of cost; $\$329 \div \frac{7}{6} = \282 .

486. The net price of a piano after deducting $33\frac{1}{3}\%$, 20% , 10% and 5% is $\$572.34\frac{1}{3}$. Find the list price.

Ans.
$$\frac{572.34\frac{1}{3}}{.66\frac{2}{3} \times .80 \times .90 \times .95} = \$1255.35.$$

487. A bankrupt owes \$4,500; his assets are \$1,200. What sum will a creditor receive whose claim is \$360?

Ans.
$$\frac{1200 \times 360}{4500} = \$96.$$

488. An agent bought hay for \$8.50 per ton and received a commission of 5% . How much per ton does the hay cost his principal?

Ans. $\$8.50 \times .05 + \$8.50 = \$8.92\frac{1}{2}$.

489. A man paid \$2550 for 5% railway stock at $127\frac{3}{8}\%$, brokerage $\frac{1}{8}\%$; how many shares did he buy? What was his annual income?

Ans. $127\frac{3}{8}\% + \frac{1}{8}\% = 127\frac{1}{2}\%$; $\$2550 \div 127.5 = 20$;
 $\$100 \times 20 \times .05 = \100 .

490. Find the simple interest of \$5,000 at $4\frac{1}{2}\%$ from August 25, 1900, till June 13, 1903.

Ans. Time = 1008 da.
$$\frac{5000 \times 1008 \times 4.5}{360 \times 100} = \$630.$$

491. Find the difference between a single discount of 40% and successive discounts of 25% and 5% on a bill amounting to \$800.

Ans. $(\$800 \times .75 \times .95) - (\$800 \times .60) = \$90.$

492. Find the amount of \$1357.63 at $5\frac{1}{2}\%$ simple interest from June 1, 1897, to September 19, 1900.

Ans.—\$1604.04.

493. Two successive discounts of 15% and 10% reduced a bill to \$489.60; what was the original bill?

Ans. $\$489.60 \div (.85 \times .90) = \$640.$

494. A merchant by selling tea at 50 cents a pound loses 20 per cent.; what did the tea cost him a pound?

Ans. $\$.50 = 80\%$ or $\frac{4}{5}$ of cost; $.50 \div \frac{4}{5} = .62\frac{1}{2}.$

495. Find the first cost of goods that retail for \$500 when the manufacturer, wholesale dealer, and shopkeeper each makes a profit of 25 per cent.

Ans. \$256.

496. The discount on goods, at 30%, 10% and 5% off, is \$23.94. What is the list price?

Ans. 1st dis. \$300; 2nd \$70; 3rd \$31.50; $1000 - 598.50 = 401.50 = 40.15\%$; $\$23.94 \div 40.15 = \$59.626.$

497. A man sold a carriage for \$207 thereby gaining $12\frac{1}{2}\%$; how much did he gain?

Ans. $\$207 = 112\frac{1}{2}\%$ or $\frac{9}{8}$ of cost; $207 \div \frac{9}{8} = \$184$ cost; $\$207 - \$184 = \$23.$

498. Find the amount of \$828 at $4\frac{1}{2}\%$ simple interest from August 31, 1901, to May 19, 1902.

Ans. \$26.703.

499. What is the difference in rate of income on investment between 3 per cent. stock quoted at 104, and 4 per cent. quoted at 93?

Ans. $3.00 \div 1.04 = 2.88461$; $4.00 \div .93 = 4.30107$; $4.30107 - 2.88461 = 1.41646.$

500. On property whose valuation is \$500,000, a tax is laid to pay for a public building costing \$8,136 and the collector's fee of \$164; what is the rate of taxation?

Ans. $\$8136 + \$164 = \$8300$; $\$8300 \div 500000 = .0166$.

501. A 90 day promissory note for \$376.85 with interest at 5% is due to-day; find the amount and the date of the note.

Ans. $\$381.5606\frac{1}{4}$.

502. A invests his money at 4 per cent. and receives an annual income of \$660; B invests his money at 6 per cent. and receives \$15 more than A; which has the more money invested, and how much more?

Ans. $\$660 \div .04 = \16500 ; $\$675 \div .06 = \11250 ;
 $\$16500 - \$11250 = \$5250$.

503. A school-house costing \$9500 is to be built in a district whose property is valued at \$1,920,000; find (a) the rate of taxation, (b) the amount of tax to be paid by a man whose property is valued at \$6,500. (No allowance for collection.)

Ans. (a) $.0049\frac{2}{3}\%$; (b) \$32.16.

504. Find the simple interest of \$653.25 at $3\frac{1}{2}\%$ from September 25, 1902, till February 13, 1906.

Ans. \$88.40.

505. An agent buys 2000 bushels of grain @ $91\frac{1}{2}c$. a bushel; would it be better for the agent to charge a commission of $4\frac{1}{2}\%$ or of 4c. a bushel? Find the difference between the two commissions.

Ans. $4\frac{1}{2}\%$; \$2.35.

506. A, B, C, formed a partnership. A furnished \$900; B, \$1,500; C, \$1,200; they lost \$1,260. How much was each man's share of the loss?

Ans. A, B and C = \$3600; $\frac{900}{3600} = \frac{1}{4}$; $\$1260 \times$

$\frac{3}{4} = \$315$, A. $\frac{1500}{3600} = \frac{5}{12}$; $\$1260 \times \frac{5}{12} = \525 , B.

$\frac{1200}{3600} = \frac{1}{3}$; $\$1260 \times \frac{1}{3} = \420 , C.

507. Goods bought at 20% and 10% off and sold at list price produce what per cent of profit on their cost?

Ans. $100\% - 20\% - 10\% = 70\%$; $100\% - 70\% = 30\%$; $30 \div 70 = 42\frac{2}{7}\%$.

508. Find the annual income yielded by an investment of \$1640 $\frac{5}{8}$ in U. S. 4's at 109 $\frac{3}{8}$.

Ans. $1640.625 \div 109.375 = 15$; $15 \times 100 = \$1500$; $\$1500 \times .04 = \60 .

509. A piece of property was sold for \$2,378.75 at a loss of 13 $\frac{1}{2}\%$ on the purchase price. What was the purchase price?

Ans. $2378.75 \div (1.00 - .13\frac{1}{2}) = \2750 .

510. Find the present worth of a debt of \$301.60 due 8 mo. 21 da. hence, money being worth 6% per annum.

Ans. Int. on \$1 for 8 mo. 21 days = .0435; $\$301.60 \div 1.0435 = \289.02 .

511. What principal at interest at 5% per annum for 3 yrs. 6 m. 9 da. will amount to \$705.75?

Ans. Int. on \$1.00 for time stated = .17625; $\$705.75 \div 1.17625 = \600 .

512. November 1, 1897, the common stock of the Lake Erie and Western Railroad Company was quoted at 17 $\frac{1}{2}$. Find the cost on that date of 24 shares, brokerage $\frac{1}{8}\%$.

Ans. $(17\frac{1}{2} + \frac{1}{8}) \times \$24 = \$423$.

513. If a speculator purchased Reading R. R. stock at 32 $\frac{3}{4}$ and sold it at 31 $\frac{1}{2}$, what per cent of his investment did he lose?

Ans. $1\frac{1}{4} \div 32\frac{3}{4} = .0381 = 3.81\%$.

514. Find the simple interest of \$653.25 at 3 $\frac{1}{2}\%$ from September 25, 1902 till February 13, 1906.

Ans. Time = 3 yrs., 4 mo., 18 da.; int. on \$1.00 for time stated at $3\frac{1}{2}\%$ = $.135\frac{1}{2}\%$; $.135\frac{1}{2}\% \times \$663.25 = \$88.40$.

515. Bought a carriage for \$125.75 for which I gave my note dated Oct. 5, 1883, due in six months. What was the value of the note Jan. 1, 1884?

Ans. Note matures Apr. 5, 1884. Term of discount = 95 days; $\frac{\$125.75 \times 95 \times 6}{360 \times 100} = \1.99 ; $\$125.75 - \$1.99 = \$123.76$.

516. Upon a promissory note, on demand, dated July 4, 1882, for \$800, are the following indorsements: Aug. 10, 1882, \$144; Nov. 1, 1882, \$90; Jan. 1, 1883, \$400; March 4, 1883, \$100; what amount remained due June 1, 1883?

Ans.

Am't of	\$800	for	332	days	=	\$844.26 $\frac{2}{3}$
" "	144	"	295	"	=	\$151.08
" "	90	"	212	"	=	93.45
" "	400	"	151	"	=	410.06 $\frac{2}{3}$
" "	100	"	89	"	=	101.48 $\frac{1}{2}$
						<hr/> 756.08
						<hr/> \$87.18 $\frac{2}{3}$

517. March 11, 1898, there was due on a note for \$500 and interest at 6% per annum, \$509.60. On what date was the note given?

Ans. $\$509.60 - \$500 = \$9.60$; $\$500 \times .06 = \30 ; $9.60 \div 30 = .32$; $.32 \times 12 = 3.84$; $.84 \times 30 = 25.2$; Mar. 11, 1908 — 3 mo., 25.2 da. = Nov. 15, 1897.

518. A broker bought goods at $\frac{3}{4}\%$ commission; paid \$750 for expenses, and sent a bill for \$23343.75; what was the amount of the purchase?

Ans. $\$23343.75 - \$750 = \$22593.75$; $\$22593.75 \div (1 - .0075) = \22764.48 .

519. A house is valued at \$10000. What will it cost to have it insured to $\frac{2}{3}$ of its value at $1\frac{1}{4}\%$ premium?

Ans. $\$10000 \times \frac{2}{3} \times .0125 = \$73.33\frac{1}{3}$.

520. Find the simple interest on \$2,580 at seven per cent per annum for 3 years, 5 months and 15 days.

$$\text{Ans. } \$2580 \times .2420\% = \$624.57\frac{1}{2}.$$

521. What is the amount of \$290 for 1 yr. 9 mo. 12 da., at 6 per cent simple interest?

$$\text{Ans. } .107 \text{ interest on } \$1.00 \text{ for time stated; } \$290 \times .107 = \$31.03.$$

522. What is the loss on 40 shares of stock bought at 109 $\frac{3}{8}$ and sold at 106 $\frac{3}{8}$, brokerage being $\frac{1}{8}\%$ in each case?

$$\text{Ans. } \$110 \times 40 = \$4400; \$106\frac{3}{4} \times 40 = \$4250; \$4400 - \$4250 = \$150.$$

523. A savings bank pays 4% interest compounded semi-annually. A makes a deposit of \$50 every six months beginning July 1, 1901. What amount stands to his credit Jan. 1, 1903?

$$\text{Ans. } \$50 \text{ July 1, '01; } \$101 \text{ Jan. 1, '02; } \$153.02 \text{ July 1, '02; } \$206.08 \text{ Jan. 1, '03.}$$

524. On a bill of \$256 what single rate of discount is equivalent to successive discounts of 15, 10 and 5?

$$\text{Ans. } .85 \times .90 \times .95 = .726750; 1. - .72675 = .27325.$$

525. Find the difference between the proceeds of a bank note for \$800 due in 90 days without interest and the present worth of a debt of \$800 due in 90 days.

$$\text{Ans. } \frac{1 \times 90 \times 6}{360 \times 100} = .015; \frac{\$300 \times 90 \times 6}{360 \times 100} = \$12; \\ \$800 \div 1.015 = \$788.177; \$800 - \$12 = 788; \$788.177 - \$788 = \$177.$$

526. By selling a horse for \$144 a profit of 60 per cent is made; find the cost of the horse.

$$\text{Ans. } \$144 \div 1.60 = \$90.$$

527. Find the proceeds of a note for \$180 due March 25, 1898. and discounted at a Utica, New York, bank January 31, 1898.

Ans. Term of discount is from Jan. 31 to Mar. 25

$$= 43 \text{ days; int. } \frac{180 \times 43 \times 6}{360 \times 100} = \$1.29; \$180 - \$1.29$$

$$= \$178.71.$$

528. A lot of goods was sold for \$1015.30 at a loss of $31\frac{1}{4}\%$; find the loss.

Ans. $\$1015.30 \div .6875 = \$1476.80; \$1476.80 - \$1015.30 = \$461.50.$

529. An agent sold cloth @ \$1.70 a yard; his commission was 3% and the proceeds of the sale \$824.50. Find the number of yards sold.

Ans. $\$824.50 \div .97 = \$850; \$850 \div 1.70 = 500$
 yds.

530. If a merchant sell goods that are marked 30 per cent. above cost at 25 per cent. below the price marked, what per cent. of the cost does he gain or lose?

Ans. $130\% \times .25 = 32.50; 130\% - 32.50 = 97.50;$
 $100\% - 97\frac{1}{2}\% = 2\frac{1}{2}\% \text{ loss.}$

531. Find the exact interest of \$764.50 for 90 days at 5%.

Ans. $\$9.42\frac{1}{2}.$

532. A newsboy bought papers for $1\frac{1}{2}c.$ each and sold them for 2c. each; find his rate of gain and his total gain in selling 56 papers.

Ans. $(.02 - .01\frac{1}{2}) \times 56 = .28; .005 \div .015 = 33\frac{1}{3}\%.$

533. A, B and C invest \$3870 in a store; $\frac{1}{2}$ of A's share is equal to $\frac{1}{3}$ of B's and to $\frac{1}{4}$ of C's. Repairs cost \$98.70 a year and taxes are at the rate of $\frac{1}{2}\%$. The store rents so as to pay 4% net on the investment. For how much does the store rent and how much does each partner receive?

Ans. $\$3870 \times 4\frac{1}{2}\% = \$173.15; \$173.15 + \$98.70 =$
 $\$271.85 \text{ Rent. } \$3870 \times 4\% = \$154.80; \$154.80 \div 9 =$
 $\$17.20. \$17.20 \times 2 = \$34.40, \text{ A's; } \$17.20 \times 3 = \$51.60,$
 B's; $\$17.20 \times 4 = \$68.80, \text{ C's.}$

534. If the cost of erecting a \$38,000 building is assessed upon \$325,000 capital stock, what must a stockholder pay who owns 100 shares at \$100 each?

Ans. $\$38000 \div \$325000 = .11\frac{9}{13}$; $\$100 \times 100 \times .11\frac{9}{13} = \1169.23 .

535. A house worth \$3,500 was insured for 75% of its value at the rate of $\frac{3}{4}\%$; find the premium paid.

Ans. $\$3500 \times .75 = \2625 ; $\$2625 \times \frac{3}{4}\% = \$18.68\frac{3}{4}$.

536. Trade discounts of 20%, 10%, and 3% are equivalent to what single discount on the list price?

Ans. $1.00 - (.80 \times .90 \times .97) = 30.16$.

537. A lawyer collected 75% of an account of \$3,416. After charging 5% commission, what amount should he pay over?

Ans. $\$3416 \times .75 = \2562 ; $\$2562 \times .05 = \128.10 ; $\$2562 - \$128.10 = \$2433.90$.

538. An insurance agent writes in one month \$7000 at annual premium \$35 per \$1000; \$14500 at \$32 per \$1000; \$3500 at \$29 per \$1000; and \$1700 at \$26 per \$1000. He receives a commission of 45 per cent on the first annual premium. What is the amount of his earnings for the month?

Ans. $(\$35 \times 7) + (32 \times 14\frac{1}{2}) + (29 \times 3\frac{1}{2}) + (26 \times 1.7) = 854.70$; $\$854.70 \times .45 = \$384.61\frac{1}{2}$.

539. How much money must be invested in stocks paying five per cent and selling at 120, to produce an income of \$2000 per annum?

Ans. $\$2000 \div 5\% = \400 shares. $\$120 \times 400 = \$48,000$.

540. Find the simple interest on \$2980 for 1 yr. 4 mo. at 4%.

Ans. Int. on \$1 at 6% for 1 yr. = \$.06
Int. on \$1 at 6% for 4 mo. = \$.02

\$\$.08

$8 \div 6 \times 4 = 5\frac{1}{3}$ Int.
 $\$2980 \times 5\frac{1}{3}\% = \$158.93\frac{1}{3}$.

541. For what sum must I write my note at 60 days at 6 per cent. to receive from the Commercial Bank \$150?

Ans. Int. for 60 da. = .01; \$1.00 — .01 = 99.
 $\$150 \div 99 = \$151.51.$

542. What is the per cent of loss on stock purchased at $93\frac{1}{4}$, and sold at $86\frac{7}{8}$?

Ans. $93\frac{1}{4} - 86\frac{7}{8} = 6\frac{3}{8}$; $6\frac{3}{8} \div 93\frac{1}{4} = .06836.$

543. A speculator bought land for \$960 and sold it for \$1060. What rate per cent of profit did he realize?

Ans. $1060 - 960 = 100$; $100 \div 960 = 10\frac{5}{12}\%$.

544. Find the proceeds of a promissory note for \$500 payable in 3 months, discounted at bank at 6 per cent?

Ans.
$$\frac{\$500 \times 90 \times 6}{360 \times 100} = 7.50; \$500 - \$7.50 = \$492.50.$$

545. What sum of money at 5% simple interest, will produce, in one year and three months, the same interest that \$2,940 will produce at 4% in two years and six months? (Solve by proportion.)

Ans.
$$\begin{array}{r} 5 : 4 \\ 1\frac{1}{4} : 2\frac{1}{2} \\ 4 \times 5 \times 4 \\ \hline 5 \times 2 \times 5 \end{array} : : 2940 : x;$$

$$\frac{4 \times 5 \times 4}{5 \times 2 \times 5} \times 2940 = \$4704.$$

546. The bank discount on a note for \$300, discounted 2 mo. 12 da. before it was due, is equal to what rate of interest per annum on the proceeds?

Ans. Rate for 2 mo. 12 da. = .012; $300 \times .012 = \$3.60$; $300 - 3.60 = 296.40$; $3.60 \div 296.40 = .01214.$

547. A merchant buys through an agent 640 yards of carpet @ 75c. a yard and pays $\frac{3}{4}\%$ commission; the freight bill is \$2.80. What is the lowest price a yard at which the merchant can sell the carpet without loss?

Ans. $$.75 \times 640 = \480 cost of carpet; $\$480 \times .00\frac{3}{4} = \3.60 com.; $\$480 + \$3.60 + \$2.80 = \486.40 total cost; $\$486.40 \div 640 = \$.76$ per yd.

548. A man sold 15 bushels of potatoes at 60 cents a bushel, thereby gaining \$2.25; find the rate per cent of gain.

Ans. $.60 \times 15 = \$9.00$; $\$9.00 - \$2.25 = \$6.75$; $\$2.25 \div \$6.75 = 33\frac{1}{3}\%$ gain.

549. A house valued at \$6,000 is insured for $\frac{3}{4}$ of its value, at the rate of $\frac{1}{2}$ of 1% a year; how much is the annual premium?

Ans. $\frac{3}{4}$ of \$6000 = \$4500; $\$4500 \times .005 = \22.50 .

550. Find the simple interest on \$685 for 3 years, 5 months at 7%.

Ans. Int. on \$1.00 for time stated at 7% = $.239\frac{1}{6}$; $.239\frac{1}{6} \times \$685 = \163.83 .

551. If 20% is lost in selling a house for \$1,200, for what should it have been sold to gain 20%?

Ans. $\$1200 = 80\%$ or $\frac{4}{5}$ of value; $\$1200 \div \frac{4}{5} = \1500 ; $\$1500 \times 1.20 = \1800 .

552. Find the amount of \$380 at 5% simple interest from March 9, 1898, to April 27, 1901.

Ans. Int. on \$1.00 at 5% for 3 yrs. 1 mo. 18 da. = $.166\frac{2}{3}$; $.166\frac{2}{3} \times \$380 + \$380 = 443.313$.

553. Silk is sold at a gain of $33\frac{1}{3}\%$ which is a gain of 30c. on a yard; find the cost and the selling price a yard of the silk.

Ans. $.30 \times 3 = \$.90$ cost; $.90 + .30 = \$1.20$ S. P.

554. The proceeds of a note for \$500 discounted at 6% is \$492.50. Find the term of discount.

Ans. $\$500 - \$492.50 = \$7.50$; $500 \times 6\% = \$30$; $7.50 \div 30 = .25$ or $\frac{1}{4}$ of a year = 3 months.

555. A collecting agent whose commission is 2% remits to his employer \$2,808.19; what amount did he collect?

Ans. $\$2808.19 \div .98 = \$2865.50.$

558. The list price of a piano was \$600. A dealer bought it at 40% and 5% discount and sold it at $37\frac{1}{2}\%$ profit. What was the selling price?

Ans. $\$600 - 40\% - 5\% = \$342; \$342 \times 1.375 = \$470.25.$

557. The discounts on a bill of goods at 15% and 8% amounted to \$38.15. Find how much the goods cost the purchaser.

Ans. \$175.

558. What is the exact interest on \$81 from Dec. 31, 1902, to March 12, 1903, at 6%?

Ans. \$945.

559. A depositor in a savings bank receives \$21.87 $\frac{1}{2}$ every 6 months on \$1,250 deposited; what is the rate per cent?

Ans. $43.75 \div 1250 = .035 = 3\frac{1}{2}\%.$

560. Find the difference between a single discount of 40 per cent and successive discounts of 25 per cent and 5 per cent on a bill amounting to \$800.

Ans. \$90.

561. A speculator bought Wabash R. R. stock at $22\frac{1}{4}$ and sold the same at $20\frac{3}{4}$, brokerage $\frac{1}{8}$ both for buying and selling, and lost \$1,093.75 by the transaction. How many shares did he buy?

Ans. $22\frac{1}{4} + \frac{1}{8} = 22\frac{3}{8}; 20\frac{3}{4} - \frac{1}{8} = 20\frac{5}{8}; 22\frac{3}{8} - 20\frac{5}{8} = 1\frac{3}{4}; \$1093.75 \div 1.75 = 625.$

562. In a certain school district assessed at \$80,000 a tax of \$1200 is raised; Mr. B's assessed valuation is \$6840. Find the rate of taxation and Mr. B's tax.

Ans. $1200 \div 80,000 = .015; .015 \times 6840 = \$102.60.$

563. What will it cost to carpet a room 18 feet by 27 feet at 85 cents a square yard?

Ans. $\$.85 \times (18 \div 3) \times (27 \div 3) = \$45.90.$

564. Find the amount of a note for \$940 at $3\frac{1}{2}\%$ interest, dated January 2, 1903, and due Mar. 3, 1903.

Ans. \$945.78.

565. A man sells 45 shares of New York Central stock paying 5%, at 118 and invests in New York Central $3\frac{1}{2}\%$ bonds at 90. By how much is his yearly income changed? How does the certainty of his income from the bonds compare with that from his previous investment?

Ans. $\$100 \times 45 \times 5\% = \225 ; $118 \times 45 \div 90 = 59$; $\$100 \times 59 \times 3\frac{1}{2}\% = \206.50 ; $\$225 - \$206.50 = \$18.50$.

566. Find the simple interest of \$620 at $4\frac{1}{2}\%$ from September 27, 1900, to May 15, 1903.

Ans. \$73.47.

567. If the gain by selling R. W. & O. R. R. stock that cost $95\frac{1}{2}$ at $101\frac{1}{4}$ is \$74.75, what is the par value of the stock?

Ans. $101\frac{1}{4} - 95\frac{1}{2} = 5\frac{3}{4}$; $\$74.75 \div 5.75 = 13$; $\$100 \times 13 = \1300 .

568. Find the exact interest on \$50 for 63 days at $3\frac{1}{2}\%$ per cent.

Ans. \$.302.

569. Find the proceeds of a 90 day note, dated January 31, 1904, for \$2,040 and discounted February 25, 1904, at 6%.

Ans. Note matures May 1; term of discount is from Feb. 25 to May 1 = 65 days.

$\$2040 \times 65 \times 6$
 $\frac{\quad}{360 \times 100} = \22.10 ; $\$2240 - \$22.10 = \$2017.90$.

570. What annual income will a person receive from U. S. 4's that cost \$1,555.50 when bought at $129\frac{1}{2}$, brokerage $\frac{1}{8}$?

Ans. $\$1555.50 \div 129.625 = 12$; $\$100 \times 12 \times .04 = \48 .

571. In a certain school district assessed at \$90,000 a tax of \$1,500 is raised. Mr. A is assessed \$4,500. Find the rate of taxation per \$1,000 of assessment and Mr. A's tax.

Ans. $\frac{1}{60} = 1\frac{2}{3}\%$; $\$.01\frac{2}{3} \times 1000 = \16.67 ; $\$4500 \times .01\frac{2}{3}\% = \75 .

572. How much must be invested in 5% bonds at 115½ to secure an annual income of \$800?

Ans. $\$800 \div 5 = 160$; $160 \times 115\frac{1}{2} = \18480 .

573. A man fails and pays 67 cents on a dollar; after paying his lawyer fee of 4%, how much would a creditor receive on a claim of \$625?

Ans. $.67 \times \$625 = \418.75 ; $\$418.75 \times .04 = \16.75 ; $418.75 - \$16.75 = \402 .

574. A man who pays an annual premium of 2½% on a life insurance policy for \$1500, dies after 18 payments; find how much more his heirs receive than has been paid in.

Ans. $2\frac{1}{2}\% \times 18 = 45\%$; $\$1500 \times .45 = \675 ; $\$1500 - \$675 = \$825$.

575. How much interest will \$732 earn in 3 years, 7 months and 17 days at 3½% simple interest.

Ans. \$89.354.

576. Find the annual premium on a house worth \$12,000 insured for ⅝ its value at ½ per cent.

Ans. $\frac{5}{8}$ of 12000 $\times \frac{1}{2}\% = \$50$.

577. An agent's commission on a sale of fruit was \$31.15, the freight and storage paid by him was \$5.20, and he remits the consignor as the net proceeds \$586.65. Find the rate of commission charged by the agent.

Ans. $\$586.65 + \$31.15 + \$5.20 = \623 ; $\$31.15 \div 623 = 5\%$.

578. A commission merchant remits \$532 as the proceeds of a sale of 200 barrels of apples, his com-

mission being 5%. At what price per barrel were they sold?

Ans. $\$532 \div .95 = \560 ; $\$560 \div 200 = \2.80 .

579. Find the cost of 40 shares of Union Pacific R. R. stock at $7\frac{1}{4}$, brokerage $\frac{1}{8}\%$.

Ans. \$295.

580. A teacher deposited \$240 in a savings bank that paid interest on deposits at the rate of 4% per annum compounded quarterly. How much would be due the teacher at the end of two years?

Ans. \$259.78.

581. A dairyman consigned to a commission merchant 5 packages of butter weighing in the aggregate 256 pounds net. The commission merchant paid \$2.32 for transportation charges and, after retaining his commission of 5%, remitted the consignor \$70.64. For what price per pound was the butter sold?

Ans. $\$70.64 + \$2.32 = \$72.96$; $72.96 \div .95 = \$76.80$; $\$76.80 \div 256 = \30 .

582. If $16\frac{2}{3}\%$ of the selling price of an article is profit, what is the gain per cent upon its cost?

Ans. $100\% - 16\frac{2}{3}\% = 83\frac{1}{3}\%$; $16\frac{2}{3}\% \div 83\frac{1}{3}\% = .2 = 20\%$.

583. Find the amount of \$137.50 at simple interest for 1 yr. 2 mo. 13 da., at 5% per annum.

Ans. \$145.769.

584. A six months note for \$600 without interest, dated Dec. 4, 1905, is discounted at a bank Dec. 29 at 6%; find the discount and the proceeds.

Ans. Note matures May 4, 1906; term of discount is from Dec. 29 to May 4 = 126 days.

$\$600 \times 126 \times 6$
 $\hline 360 \times 100 = \12.60 ; $\$600 - \$12.60 = \$587.40$.

585. A man has \$1,000 invested in Erie first preferred stock at 80 that pays a semi-annual dividend of

2%, and \$980 in Union Pacific first preferred stock at 98 that pays a semi-annual dividend of 2%; he sells the above stocks at cost and invests the proceeds in United States steel first preferred stock at 86, thereby increasing his annual dividend \$90; find the per cent. of quarterly dividend that the steel stock pays.

Ans. $\$1600 \div 80 = 20$; $\$980 \div 98 = 10$; $(1600 - 980) \div 86 = 30$; $100 \times 20 \times .04 = \80 ; $100 \times 10 \times .04 = \40 ; $\$40 + \$80 + \$90 = \210 ; $100 \times 30 = \$3000$; $\$210 \div 3000 = .07$; $.07 \div 4 = 1\frac{3}{4}\%$.

586. My agent sells 2000 yards of cloth at 24 cents a yard; he allows the purchaser 5 per cent discount for cash, and charges me $2\frac{1}{2}\%$ per cent of the cash receipts; how much money does he pay over to me?

Ans. $\$2000 \times .24 = \480 ; $480 \times .05 = \$24$; $\$480 \times 24 \times 2\frac{1}{2}\% = \11.50 ; $\$456 - 11.50 = \444.50 .

587. A note for \$384, without interest, dated June 30, 1905, and due Aug. 30, 1905, was discounted at 6% July 31, 1905; find the proceeds of the note.

Ans. Term of discount from July 31 to Aug. 30 = 30 days.

$\$384 \times 30 \times 6$

 $360 \times 100 = \$1.92$; $\$384 - \$1.92 = \$382.08$.

588. A commission merchant was sent \$704.52 which he invested in 950 bushels of wheat, after deducting his commission of 3%; find the cost a bushel of the wheat.

Ans. $\$704.52 \div 1.03 = \684 ; $\$684 \div 950 = \$.72$.

589. The interest on a certain sum for 1 yr. 6 mo. 8 da. at 6 per cent per annum is \$24.56. Find the principal.

Ans. $\$24.56 \div .091\frac{1}{3} = \259.436 .

590. A man bought a bicycle, paying \$56.16 for it; his commercial discounts from the list price were 25 and 20 and his discount for cash was $2\frac{1}{2}\%$. Find the list price of the bicycle.

Ans. \$96.

591. The proceeds of a 3 months note discounted at bank in this State the day it was made, at 6% per annum, were \$177.30. Find the face of the note.

Ans. Term of discount = $\frac{1}{4}$ yr.; $\frac{1}{4}$ of 6% = .015;
 $1 - .015 = .985$; $\$177.30 \div .985 = \180 .

592. Find the amount of \$150 for two years 7 months and 21 days at 6 per cent.

Ans. \$173.77 $\frac{1}{2}$.

593. Find the proceeds of a note for \$840 discounted at bank 26 days before it was due, at 6% per annum.

Ans. Term of discount = 26 days.
 $\$840 \times 26 \times 6$

 $360 \times 100 = \$3.64$; $\$840 - \$3.64 = \$836.36$.

594. Find the simple interest on \$500 from April 5, 1901, to November 10, 1904, at 6 per cent.

Ans. \$107.91 $\frac{2}{3}$.

595. A man purchased through his broker 20 shares N. Y. Central stock at 162 $\frac{3}{4}$ %, commission $\frac{1}{8}$ %; the stock pays 6% dividend. Find cost of stock, amount of dividend, and rate of income on the investment.

Ans. $162\frac{3}{4} \times 20 = \3255 ; $\$2000 \times 6\% = \120 ;
 $\$120 \div \$3255 = .0368 = 3.68\%$.

596. Of a street railroad property, the road represents 62%, the rolling stock 17%, the terminals 7%, and the power equipment the remainder, or \$31,500. Find the value of the property.

Ans. $100\% - 86\% = 14\%$; $\$31,500 \div .14 = \$225,000$.

597. What must be paid for stock paying an annual dividend of 3% to secure an annual income of 7% from the investment?

Ans. $3\% \div 7\% = \$42\frac{6}{7}$.

598. A house valued at \$3216 was insured for $\frac{5}{8}$ its value at $\frac{3}{4}\%$; what annual premium was paid?

Ans. $\frac{5}{6}$ of \$3216 = \$2680; $\$2680 \times \frac{3}{4}\% = \20.10 .

599. A man fails in business; his debts are \$50,200; his net assets are \$3,765. What should a creditor receive on a claim of \$6,420?

Ans. $\$3765 \div \$50200 = .075$; $\$6420 \times .075 = \481.50 .

600. An agent charged 2% commission and \$56.40 expenses for selling grain and sent his principal \$1477.30; find the sum for which the grain was sold.

Ans. $\$1533.70 \div .98 = \1565 .

601. Find the simple interest of \$634.60 at $4\frac{1}{2}\%$ from November 29, 1902, till June 5, 1904.

Ans. $.06825 \times \$634.60 = \43.31 .

602. What amount invested in U. S. 4's at 115 will provide an annual income of \$1,000?

Ans. $\$1000 \div 4 = 250$; $\$115 \times 250 = \28750 .

603. When New York Central $3\frac{1}{2}\%$ bonds are bought for 90%, brokerage $\frac{1}{8}$, what per cent. is realized on the investment?

Ans. $3\frac{1}{2}\% \div 90\frac{1}{2} = 3.8674\%$.

604. Given the principal, \$150, the interest, \$14.55, and the rate per annum, 6%. Required the time.

Ans. $\$150 \times .06 = \9 ; $\$14.55 \div 9 = 1.6\frac{1}{6}$ yrs.; $1.6\frac{1}{6}$ yrs. = 1 yr. 7 mo. 12 da.

605. An agent buys 2,000 bushels of grain @ $91\frac{1}{2}$ c. a bushel; would it be better for the agent to charge a commission of $4\frac{1}{2}\%$ or of 4c. a bushel? Find the difference between the two commissions.

Ans. $2000 \times .91\frac{1}{2} \times .04\frac{1}{2} = \82.35 ; $2000 \times .04 = \$80$; $\$82.35 - \$80 = \$2.35$.

606. Trade discounts of 20%, 10%, and $8\frac{1}{3}\%$ are equivalent to what single discount?

Ans. $\$1000 =$ assumed list p.; $\$660 =$ cost; $\$1000 - \$660 = \$340$; $340 \div 1000 = 34\%$.

607. A manufacturer sent his agent \$3,177.81 to invest in leather and to pay his commission of $\frac{1}{2}\%$; how much did the agent invest and how much was his commission?

Ans. $\$3177.81 \div 1.005 = \3162 ; $\$3177.81 - \$3162 = \$15.81$.

608. A grocer sold tea for $87\frac{1}{2}\text{c.}$ a pound, thus gaining $12\frac{1}{2}\text{c.}$ a pound; find his per cent. of gain.

Ans. $\$.87\frac{1}{2} - \$.12\frac{1}{2} = \$.75$; $.12\frac{1}{2} \div .75 = 16\frac{2}{3}\%$.

609. If 4% bonds to the amount of \$8000 face value are bought at $92\frac{1}{2}$, find the cost of the bonds and the rate of income on the investment.

Ans. $\$8000 \div 100 = 80$ bonds; $8000 \times 4\% = \$320$; $92\frac{1}{2} \times 80 = \7400 ; $\$320 \div \$7400 = 4.32\%$.

610. After selling 75% of a stock of goods at 25% profit, a merchant sells the remainder at $33\frac{1}{3}\%$ loss; find the gain or loss per cent. on the entire transaction.

Ans. $75\% \times .25 + 75 = 93.75$; $25 - (25\% \times 33\frac{1}{3}) = 16\frac{2}{3}$; $16\frac{2}{3} + 93\frac{3}{4} = 110\frac{5}{12}\%$; $110\frac{5}{12} - 100 = 10\frac{5}{12}\%$.

611. Find the interest on \$375 at $4\frac{1}{2}\%$ from July 1, 1896, to March 1, 1907.

Ans. \$180.

612. Find the exact interest on \$380.00 at 6% per annum from August 27, 1900, to January 4, 1901.

Ans. \$7.93.

613. A discount of 8, 5 and 2 was given on goods whose net price was \$800. Find list price.

Ans. $[(\$800 \div 98) \div .95] \div .92 = \934.01 .

614. A semi-annual dividend of 2% on Illinois Central R. R. stock bought at $92\frac{1}{2}$ is equivalent to what per cent. of annual interest on the investment?

Ans. $4\% = \text{annual dividend}$; $4\% \div 92\frac{1}{2} = 4\frac{2}{37}\%$.

615. Find the difference between the exact interest and the interest by the 6% method of \$730 for 90 days at 6%.

Ans. Ninety days = 3 mo. = $\frac{1}{4}$ yr.; $(\$7.30 \times .06) \times \frac{1}{4} = \10.95 ; $\$10.95 \times \frac{1}{100} = \15 .

616. Find the principal which will amount to \$540.25 in 2 years 3 months and 18 days at $31\frac{1}{2}\%$.

Ans. $\$540.25 \div 1.0805 = \500 .

617. What is the difference in rate of income on investment between 3 per cent. stock quoted at 104, and 4 per cent. quoted at 93?

Ans. 1.41646%.

618. An agent charged his principal \$106.25 (commission being $2\frac{1}{2}\%$) for buying 5000 bushels of wheat; the freight charges, etc., amounting to \$43.75. How much a bushel did the wheat cost the principal?

Ans. $\$106.25 \div 2\frac{1}{2}\% = \4250 ; $\$4250 + \$106.25 + \$43.75 = \4400 entire cost; $\$4400 \div 5000 = \$.88$.

619. An agent receives \$1,470 to be expended in the purchase of flour at \$7.50 a barrel after deducting his commission at 2 per cent. How much was his commission and how many barrels of flour could he purchase?

Ans. $\$1470 \div .98 = \1500 ; $\$1500 - \$1470 = \$30$ commission; $\$1470 \div 7.50 = 196$ bbls.

620. On January 3, 1905, a merchant took a 90-day note and discounted it at 5% at a Buffalo bank the same day, receiving \$1,975. For what sum was the note given?

Ans. Proceeds on \$1.00 = \$.9875; $\$1975 \div .9875 = \2000 .

621. April 1, 1900, James Brown gave me his note for \$210, due in 2 years, with interest. On December 15 following I had the note discounted at my bank. What did I receive?

Ans. Term of discount = 471 days;

$$\$210 + 12 = \$222;$$

$$\frac{222 \times 471 \times 5}{360 \times 100}$$

$$= \$14.52\frac{1}{4}; 222 - 14.52\frac{1}{4} = \$207.47\frac{3}{4}.$$

622. A speculator buys bonds whose par value is \$10,000 at 113 $\frac{3}{8}$ % and sells them at 115 $\frac{1}{8}$ %; how much does he gain if brokerage is $\frac{1}{8}$ % in each transaction?

Ans. $\$10000 \div 100 = 100$ shares; $\$113.50 \times 100 = \11350 . $115 \times 100 = \$11500$; difference = \$150.

623. If, after expending \$821.70 for improvements on a piece of real estate, I sell it for \$6,375, and thereby make a net gain of 11 $\frac{1}{2}$ % on the cost, how much did I pay for it?

Ans. \$4997.97.

624. Write a 90 day note for \$320, dated to-day, payable to John Smith's order at some bank near your home. Find the proceeds if it is discounted to-day at 5%.

Ans. Proceeds = \$316.

\$320. Albany, N. Y., Feb. 23, 1907.

Ninety days after date, I promise to pay to the order of John Smith, Three Hundred Twenty Dollars, for value received, at the First National Bank.

WILLIAM SMITH.

625. A horse and wagon were sold for \$120 each; the horse was sold at a loss of 25%, the wagon at a gain of 25%. Find how much was gained or lost on the whole transaction.

Ans. \$16 loss.

626. A man holding a 60 day note for \$376, without interest, due March 21, 1904, has it discounted April 19, 1904, at 6%; find the proceeds of the note.

Ans. Note matures May 20, 1904; term of discount is from Apr. 19 to May 20;

$$\frac{376 \times 31 \times 6}{360 \times 100}$$

$$\times \$1.94; \$376 - \$1.94 = \$374.06.$$

627. A dealer imports 1250 lbs. of cheese at 13c. (duty 6c per lb.), 1000 gross of matches at 70c. per gross (duty 8c. per gross) and 6 cwt. of preserved fruit valued at \$240 (duty 1c. per lb. and 35% ad valorem). What is the total cost?

Ans. \$645.50.

628. A person had his life insured for \$5,000 at an annual premium of \$27.92 per \$1,000. After making eight payments he died. How much more did his estate receive than he had paid the company?

Ans. $\$27.92 \times 5 = \139.60 ; $\$139.60 \times 8 = \1116.80 ;
 $\$5000 - \$1116.80 = \$3883.20$.

629. Find the interest on \$1 for 9 mo. 2 da. at $4\frac{1}{2}\%$ per annum.

Ans. Int. on \$1 at 6% for 9 mo. = \$.045
 Int. on \$1 at 6% for 2 da. = .003 $\frac{1}{2}$

$$\begin{array}{r} .048\frac{1}{3} \\ .048\frac{1}{3} \div 4 = .012\frac{1}{2}; .048\frac{1}{3} - .012\frac{1}{2} = .036\frac{1}{4}. \end{array}$$

630. A certain sum is invested in D. & H. R. R. stock at 168. A dividend of 5% declared on the stock at the end of a year is equivalent to what annual rate of interest on the investment ?

Ans. $5\% \div 168 = 2.97\%$.

631. How many shares of Baltimore and Ohio R. R. stock can be purchased for \$718.75, at $15\frac{1}{2}$, brokerage $\frac{1}{8}$ per cent.?

Ans. 46 shares.

632. Find the exact interest on \$504.42 from March 1, 1903, to December 25, 1905, at 6%.

Ans. Int. on \$1 for 2 yrs. = .12
 Int. on \$1 for 9 mo. = .045
 Int. on \$1 for 24 da. = .004

$$\begin{array}{r} .169 \\ \$504.42 \times .169 = \$85.246 + ; \$85.246 \times \\ \frac{1}{100} = \$1.16; \$85.246 - \$1.16 = \$84.08. \end{array}$$

633. A box of 150 oranges is bought for \$1.40; the oranges are sold at 20 cents per dozen; find the gain per cent.

Ans. $150 \div 12 = 12\frac{1}{2}$ doz.; $\$.20 \times 12\frac{1}{2} = \2.50 ;
 $\$2.50 - \$1.40 = \$1.10$ gain; $\$1.10 \div 1.40 = 78\frac{1}{4}\%$.

634. What sum at 5% interest will yield \$1.00 per day, counting 365 days as one year?

Ans. $(\$1. \times 365) \div 5\% = \7300 .

635. A 60 day note for \$630 without interest, dated December 27, 1904, is discounted January 19, 1905, at a bank at 6%; find the discount.

Ans.
$$\frac{630 \times 34 \times 6}{360 \times 100} = \$3.57.$$

636. If a merchant marks his goods at 25% above cost and sells them at 25% below his marked price, does he gain or lose and what per cent?

Ans. $(100\% + 25\%) \times 25\% = 31\frac{1}{4}\%$; $125\% - 31\frac{1}{4}\% = 83\frac{3}{4}\%$; $100\% - 83\frac{3}{4}\% = 16\frac{1}{4}\%$ loss.

637. If the discount on a note discounted at bank at 6% per annum 2 mo. 7 da. before it was due, was \$18.76, what were the proceeds?

Ans. 1661.24.

638. Find the proceeds of a 60 day note for \$830 without interest, dated December 21, 1901, and discounted January 17, 1902, at a bank at 6%.

Ans.
$$\frac{830 \times 33 \times 6}{360 \times 100} = \$4.063$$
; $\$830 - \$4.063 = \$825.937$.

639. Find the difference in a bill of \$825 between a discount of 25% and a discount of 10%; 10% and 5%.

Ans. $\$6.48\frac{3}{4}$.

640. Find the amount of \$1 at interest for 4 mo. 2 da. at $3\frac{1}{2}\%$ per annum.

Ans. \$1.012.

641. A farm was sold so as to gain \$1269, which was $23\frac{1}{2}\%$ of the purchase price. For how much was it sold?

Ans. \$6669.

642. Discounts of $12\frac{1}{2}\%$ and 4% are given on a bill of \$545; find the net amount of the bill. What single rate of discount is equivalent to the two successive discounts?

Ans. Net amt. = \$457.80; $\$68.12\frac{1}{2} + \$19.07\frac{1}{2} = \$87.20$ sum of the discts.; $\$87.20 \div 545 = 16\%$.

643. Find the interest on \$1 for 7 months and 19 days at 3% .

Ans. $.01905\%$.

644. If wool bought at 20c shrinks 20% in cleaning, at what price must it be sold to gain 20% ?

Ans. 20 cents = 80% after shrinking; $.20 \div 80\% = .25$; $.25 \times 1.20 = \$30$.

645. Find the simple interest of \$532 from September 28, 1905, to January 10, 1906, at $4\frac{1}{2}\%$.

Ans. Interest = \$.01275 on \$1.00 at $4\frac{1}{2}\%$ for time stated; $.01275 \times \$532 = \6.783 .

646. A man sold $\frac{3}{8}$ of his interest in a real estate syndicate for $\frac{5}{12}$ of what his interest cost him. Did he gain or lose and what per cent.?

Ans. $\frac{5}{12} - \frac{3}{8} = \frac{1}{24}$ gain.

647. A man obtained an insurance on his house for $\frac{3}{4}$ of its value, at $1\frac{1}{2}\%$ per cent. annually. After paying 5 premiums, the house was destroyed by fire, in consequence of which he suffered a loss (including premiums paid), of \$2,940. What was the value of the house?

Ans. \$9600.

648. Find the present worth and the true discount of a debt of \$507.50, due in 2 years, 8 months, money being worth 6%.

Ans. Present worth, \$437.50; discount, \$70.

649. Find the exact interest on \$700 at 5% per annum from April 22, 1901, to August 16, 1903.

Ans. \$80.97.

650. What sum must be invested at $6\frac{1}{2}\%$ stock at 185 to yield an annual income of \$481?

Ans. $\$481 \div \$6\frac{1}{2} = 74$ shares; $\$185 \times 74 = \13690 .

651. Find the simple interest of \$836 at $2\frac{1}{2}\%$ from May 31, 1901, to September 7, 1903.

Ans. $\$.056\frac{2}{3} \times 836 = \47.373 .

652. The proceeds of a note discounted at bank at 6% per annum, two months before it was due, were \$138.60. Find the face of the note.

Ans. Discount on \$1 = .01; proceeds of \$1 = \$.99; $\$138.60 \div .99 = \140 .

653. A borrows money for 90 days at a bank which charges 6% per annum; he pays \$21 discount. How much did he borrow?

Ans. $\$21 =$ discount for 90 days or $\frac{1}{4}$ yr.; $\$21 \times 4 = \84 ; $\$84 \div .06 = \1400 .

654. What is the per cent. of loss on a bill of goods bought for \$132 and sold for \$98.50?

Ans. $\$132 - 98.50 = \33.50 loss; $\$33.50 \div 132 = 25.378\%$.

655. Find the proceeds and the date of maturity of a 90 day note for \$540.50, dated May 26, 1904, and discounted July 1 at a bank at 6%.

Ans. Note matures Aug. 25; term of discount = 55 days.
 $\$540.50 \times 55 \times 6$

 $360 \times 100 = 4.82$; $\$540.50 - \$4.82 = \$535.68$.

656. If the interest of \$36 for 3 yr. 8 mo. 18 da. is \$8.028, what is the rate?

Ans. Int. on \$1 at 6% for 3 yrs. = \$.18
 Int. on \$1 at 6% for 8 mo. = .04
 Int. on \$1 at 6% for 18 da. = .003

.223

$.223 \div 6 = \text{Int. at } 1\%, \$0.37\frac{1}{6}; \$0.37\frac{1}{6} \times 36 = \1.338
 Int. at 1%; $\$8.028 \div \$1.338 = 6\%$.

657. A man paid \$1.50 for a book after a discount of 25% and 16% off had been allowed. What was its marked price?

Ans. \$2.40.

658. What is 150 per cent. of \$560.25? 47 is 20% of what number?

Ans. $\$560.25 \times 1.50 = \$840.37\frac{1}{2}$; $47 = 20\% = \frac{1}{5}$; $47 \times 5 = 235$.

659. The entire number of horse-power of machinery driven by steam or water, in the State of New York is estimated at 450,000, and the horse-power to be generated by the works under construction at Niagara Falls is estimated at 500,000. What per cent. will these works add to the present power?

Ans. $111\frac{1}{3}\%$.

660. Find the interest on \$112.50 for 22 da. at 5% per annum.

Ans. Int. on \$1 at 6% for 22 days = $.003\frac{1}{2}$; $.003\frac{1}{2} \div 6 = .000\frac{11}{12}$; $.000\frac{11}{12} \times 5 = .003\frac{1}{12}$; $.003\frac{1}{12} \times \$112.50 = \$34\frac{3}{8}$.

661. A man insured his house for $\frac{4}{5}$ of its value. He was allowed 35% of the policy for damage by fire and received \$2,100. What was the value of the house?

Ans. $\$2100 \div 35 = 6000$; $6000 \div \frac{4}{5} = \7500 .

662. A note for \$400 dated January 2, 1901, and bearing five per cent. interest, has the following indorsement: September 2, 1901, \$150. How much is due on January 2, 1902?

Ans. $\$400 \times .05 = \20 ; amt. of $\$400$ for 1 yr. = $\$420$; amt. of $\$150$ for 4 mo. = $\$152.50$; $\$420 - \$152.50 = \$267.50$.

663. A 90 day note for $\$560$, bearing interest at 6%, is discounted at a bank at 6% 25 days after date; find the bank discount.

Ans. Int. on note for 90 days = $\$8.40$; amt. of note when due = $\$568.40$. Term of discount = 65 days = $\$6.16$.

664. A manufacturer sent his agent $\$3177.81$ to invest in leather and to pay his commission of $\frac{1}{2}\%$; how much did the agent invest and how much was his commission?

Ans. $\$3177.81 \div 1.005 = \3162 ; commission $\$15.81$.

665. On a note for $\$1000$ with interest at 6% dated September 10, 1903, a payment of $\$350$ was made February 1, 1904. How much is due September 10, 1904?

Ans. Amount of $\$1000 = \1060 ; amount of $\$350$ for 227 days = $\$362.95$; $\$1060 - \$362.95 = \$697.05$.

666. A merchant sells certain goods at a gain of $16\frac{2}{3}\%$. What is his gain on sales amounting to $\$938$?

Ans. $\$938 = 106\frac{2}{3}\%$ or $\frac{7}{6}$; $\$938 \div \frac{7}{6} = \804 ; $\$938 - 804 = \134 .

667. A merchant marked an article so as to gain 15% but sold it for cash so as to gain $3\frac{1}{2}\%$; what per cent. of the marked price did he deduct?

Ans. $115\% - 103\frac{1}{2}\% = 11\frac{1}{2}\%$ $11.5 \div 115 = 10\%$.

668. For what sum must a man give his note at a bank for 3 months, at 6 per cent. per annum, in order to obtain $\$1,000$?

Ans. Discount at $\$1$ for 3 months = $.015$; $\$1 - .015 = \$.985$; $\$1000 \div .985 = \1015.21 .

669. Face of note $\$900$, date January 2, 1898, rate 5%. Indorsements: January 2, 1899, $\$25$; October 2, 1900, $\$500$. What was due October 26, 1901?

Ans. \$478.74.

670. Find the net proceeds from a sale of 24 shares of Western Union telegraph stock at $94\frac{1}{2}$, brokerage $\frac{1}{8}$.

Ans. $94\frac{1}{2} - \frac{1}{8} = 94\frac{3}{8}$; $94\frac{3}{8} \times 24 = \2265 .

671. On a bill of \$620 a commercial discount of 5 and 5 or a single discount of 10% is offered; which is the better offer and how much better is it?

Ans. $\$31 + \$29.45 = 60.45$ sum of discounts; $\$620 \times 10\% = \62.00 ; $\$62 - \$60.45 = \$1.55$.

672. For how much must I make a 30 day note, without interest, that I may realize \$350 if discounted at 6%.

Ans. Discount on \$1 for 30 days = .01; $\$350 \div .99 = \353.54 .

673. Find the interest on \$740 from January 2, 1904, to March 18 of the same year, at $4\frac{1}{2}$ per cent. per annum.

Ans. \$7.03.

674. A note at interest for 1 year 8 months 6 days, at $4\frac{1}{2}\%$ per annum, amounted to \$388.08. Find the principal sum secured by the note.

Ans. $\$388.08 \div 1.07575 = \360.75 .

675. An agent sold 1,600 bushels of grain @ 90c. a bushel and sent his employer \$1,418.40 as the proceeds of the sale; find the rate of the agent's commission.

Ans. $\$.90 \times 1600 = \1440 ; $\$1440 - \$1418.40 = \$21.60$; $\$21.60 \div \$1440 = 1\frac{1}{2}\%$.

676. A has \$5,280, and B has \$6,400. (a) What per cent. is A's money less than B's? What per cent. is B's more than A's?

Ans. $\$6400 - \$5280 = \$1120$; $\$1120 \div 6400 = 17\frac{1}{2}\%$; $\$1120 \div 5280 = 21\frac{1}{3}\%$.

677. A man pays \$36 for an insurance of \$4,800 which is $\frac{3}{4}$ the value of his house; find the rate of insurance and the value of his house.

Ans. $\$4800 = \frac{3}{4}$ value of house; $\$4800 \div \frac{3}{4} = \6400 ; $\$36 \div \$4800 = \frac{3}{4}\%$.

678. A tax of $7\frac{1}{2}$ mills on a dollar was laid on the property of a school district to pay for a school-house costing \$2,793; find the assessed valuation of the property.

Ans. \$372,400.

679. A house worth \$12,000 was insured for $\frac{7}{8}$ its value by three companies; the first took $\frac{1}{3}$ the risk at $\frac{1}{2}\%$ off, the second $\frac{1}{6}$ the risk at $\frac{1}{4}\%$, and the third the remainder at $\frac{3}{8}\%$. What was the whole premium paid?

Ans. $\$30.62\frac{1}{2}$.

680. If milk is 1.03 times as heavy as water, and yields 15 per cent. of its weight in cream, and cream yields 25 per cent. of its weight in butter, how many liters of milk are required to make one kilogram of butter?

Ans. $1030 \text{ g.} = 1 \text{ l. milk}$, $1030 \times .15 = 154.5 \text{ g. cream}$ in 1 l. milk, $154.5 \times .25 = 38.625 \text{ g. butter}$ in 1 l. milk, $1 \text{ kg.} = 1000 \text{ g.}$; $1000 \div 38.625 = 25,889 + 1$.

681. A standard candle is 3 feet and an electric light 12 feet from a wall on which they cast shadows of equal intensity; find the candle power of the electric light. [The intensity of light varies inversely as the square of the distance from the source of illumination.]

Ans. $(12)^2 : (3)^2 = 144 : 9 = \frac{144}{9} = 16$.

682. In what time will \$500 loaned at 6 per cent. per annum, simple interest, amount to \$552?

$$\text{Ans. } (\$552 - 500) \div (500 \times .06) = 1 \frac{22}{30} \text{ yrs.} \\ = 1 \text{ yr. 8. mo. 24 da.}$$

683. An agent sold 44 wagons @ \$135 each and gave his principal \$5197.50 as the proceeds of the sale; find the rate of the agent's commission.

$$\text{Ans. } (\$135 \times 44 - 5197.50) \div \$135 \times 44 = .125.$$

684. The proceeds of a 90 day note, without interest, discounted at 6% 32 days before it is due, are \$574.42; find the face of the note.

$$\text{Ans. Discount on } \$1 = .005\frac{1}{3}; \text{ proceeds of } \$1 = .994\frac{2}{3}; \$574.42 \div .99\frac{2}{3} = \$577.50.$$

685. A man invests \$4,996 in Pullman Car stock at 156, brokerage $\frac{1}{8}$, and receives semi-annual dividends of $3\frac{1}{2}\%$. Find the annual rate of income on his investment.

$$\text{Ans. } 4996 \div (156 + .125) = 32; \$100 \times .07 \times 32 = \$224; \$224 \div 4996 = .0448.$$

686. What would be the cost of an investment in U. S. 4's at $131\frac{1}{4}$, brokerage $\frac{1}{8}\%$, to secure an annual income of \$720?

$$\text{Ans. } (720 \div 4) \times (131\frac{1}{4} + \frac{1}{8}) = \$23647.50.$$

687. Find the simple interest of \$634.60 at $4\frac{1}{2}\%$ from November 29, 1902, till March 17, 1904.

$$\text{Ans. } \$634.60 \times .078 \div 6 \times 4\frac{1}{2} = \$37.124.$$

688. Find the proceeds of a note for \$150 due May 31, 1899, if discounted April 21, 1899, at bank at 6% per annum.

$$\text{Ans. Term of discount from Apr. 21 to May 31} = 40 \text{ days;} \\ \frac{\$150 \times 40 \times 6}{360 \times 100} = \$1; \$150 - \$1 = \$149.$$

689. If N. Y. C. & H. R. R. stock bought at 123 is sold for 131, what is the gain per cent. on the investment?

$$\text{Ans. } (131 - 123) \div 123 = .06504.$$

690 A man bought 227 pounds of butter @ $19\frac{1}{4}\%$ c. a pound and paid the bill with the proceeds of a bank note for 60 days at 6% ; find the face of the note.

$$\text{Ans. } \$19\frac{1}{4}\% \times 227 = \$44.94\frac{1}{2}\% ; \$44.94\frac{1}{2}\% \div (1. - .01) = \$45.40.$$

691. What will the total cost to a purchaser of 96 shares of stock at $126\frac{3}{4}\%$, brokerage $\frac{1}{8}\%$?

$$\text{Ans. } (\$126\frac{3}{4} + \$\frac{1}{8}) \times 96 = \$12180.$$

692. I bought a horse for \$360 and sold him for a note at 60 days for \$418. I discounted the note at 6% the day it was made. What was the gain?

$$\begin{aligned} \text{Ans. } \frac{\$418 \times 60 \times 6}{360 \times 100} &= \$4.18, \$418 - \$4.18 - \$360 \\ &= \$53.82. \end{aligned}$$

693 A house is insured for $\frac{2}{3}$ of its value at $1\frac{1}{4}\%$. The premium is \$60.25. What is the value of the house?

$$\text{Ans. } (\$60.25 \div .0125) \times \frac{3}{2} = \$7230.$$

694. A block insured for \$7,500 at $\frac{1}{4}\%$ is destroyed by fire at the end of 8 years and the company pays $\frac{4}{5}$ of the claim; what part of the insurance received is the total premium paid?

$$\text{Ans. } \$7500 \times \frac{1}{4}\% \times 8 = \$150; \frac{4}{5} \text{ of } \$7500 = \$6000; \$150 \div 6000 = .025.$$

695. The exact interest on a sum of money for 28 days at 5% per annum is \$5.60. Find the sum at interest.

$$\text{Ans. } \frac{\text{Sum} \times 28 \times 5}{365 \times 100} = \$5.60;$$

$$\frac{\text{Sum} \times 28}{7300} = \$5.60;$$

$$\text{Sum} = \$1460.$$

696. The exact interest on \$233.60, from July 5, 1897, to September 24, 1897, was 2.59%. Find the rate per annum.

Ans. From July 5 to Sept. 24 = 81 days.
 $233.60 \times 81 \times \text{int.}$

Ans. $\frac{\quad}{\quad} = 2.59\%$;

365×100
 $\$3784.32 \times \text{int.} = 18921.60; \text{int.} = .05 = 5\%.$

697. For what amount must a note be given for 60 days to afford \$1,500 proceeds, if discounted by a bank at 6%.

Ans. Discount on \$1 = \$.01; proceeds of \$1 = \$.99;
 $\$1500 \div .99 = \$1515.15.$

698. How much money must be invested in 5% bonds at 118 yield an income of \$2360 a year?

Ans. $5 \div 2360 = 472 \text{ shares}; \$118. \times 472 = \$55696.$

699. What is the bank discount on \$120 for 120 days, at 7%? (Consider 360 da. = 1 yr.)

Ans. $\frac{\$120 \times 120 \times 7}{360 \times 100} = \$2.80.$

700. Find the compound interest on \$3721 for 3 years at 4 per cent.

Ans. \$464.62.

701. A four months note for \$584, without interest, is discounted at a bank at 5% on the day of its date; find the proceeds of the note.

Ans. $\frac{584 \times 120 \times 5}{360 \times 100} = \$9.73; \$584 - \$9.73 =$
 $\$574.27.$

702. A man buys 6% stock at 140; to what rate of interest is this equivalent?

Ans. $6 \div 140 = .04285 = 4.285\%$

703. Find the simple interest on \$7864 for 3 yr. 4 mo. and 18 da. at 4%.

Ans. $203 \div 6 \times 4 = .135\frac{1}{3}$; $\$7864 \times .135\frac{1}{3} = \106.43 .

704. A railroad's gross revenue for the year 1897 was \$17,286,345.27; its gross expenses were \$14,036,345.27. If the capital of the road is \$50,000,000, what per cent. dividend could be declared at the end of the year?

Ans. $\$17,286,345.27 = \text{gross earnings};$
 $\underline{\$14,036,345.27 = \text{gross expenses};}$
 $\$3,250,000.00 = \text{gain};$

$\$3250000 \div 50000000 = .065 = 6\frac{1}{2}\%.$

705. Which produces the greater per cent. of income and how much, 5% bonds at 120 or 4% bonds at 105?

Ans. $(\$5 \times 120) - (\$4 \times 105) = .00357$; 5% bonds; .357%.

706. It costs \$36.18 to insure a store at $\frac{3}{4}\%$; find the face of the policy.

Ans. $\$36.18 \div .0075 = \4824 .

707. A man sold through a broker 176 shares of stock @ $96\frac{1}{2}$, brokerage $\frac{1}{8}\%$; what sum should the broker remit?

Ans. $(\$96\frac{1}{2} - \frac{1}{8}) \times 176 = \16962 .

708. What would be the cost of an investment in U. S. 4's at $131\frac{1}{4}$, brokerage 18%, to secure an annual income of \$720?

Ans. $(131\frac{1}{4} + \frac{1}{8}) \times (\$720 \div 4) = \$23647.50$.

709. A note for \$384, without interest, dated June 30, 1905, and due September 30, was discounted at 6% July 31, 1905; find the proceeds of the note.

Ans. Term of discount = 61 days;

$\frac{\$384 \times 61 \times 6}{360 \times 100} = \$3.90;$

$\$384 - \$3.90 = \$380.10$.

710. What is the amount of \$459.25 for 3 years 2 mo., at 3 per cent. simple interest?

Ans. 43.62 $\frac{7}{8}$.

711. A speculator bought Erie R. R. stock at 17 $\frac{1}{2}$ net, and sold it at 16 $\frac{3}{8}$ net, thereby losing \$337.50. How many shares did he buy?

Ans. $\$337.50 \div (17\frac{1}{2} - 16\frac{3}{8}) = 300$.

712. The proceeds of a note for 3 months when discounted at a bank at 6% were \$738.75. What was its face?

Ans. $\$738.75 \div (1 - .015) = \750 .

713. Find the amount of \$304.08 for 2 years, 4 months, 24 days at 5%.

Ans. \$61.83.

G. Miscellaneous.

714. A person divided \$3.50 between four boys so that each one received one-third more than the next younger. How much did each receive?

Ans. $x + \frac{1}{3}x + \frac{16}{9}x + \frac{64}{27}x = \frac{175}{27} = \3.50 ;
 $\frac{x}{27} = .02$; $x = $.54$; $\frac{16}{9}x = $.96$; $\frac{1}{3}x = $.72$;
 $\frac{64}{27}x = \$1.28$.

715. How much change should be received from a ten-dollar bill after buying 3 quires of paper at 27 cents a quire, 100 pens at 9 cents a dozen, and 2 books at 75 cents each?

Ans. $\$10. - (\$.27 \times 3) - (\$.09 \times 100 \div 12) - (\$.75 \times 2) = \$6.94$.

716. Find from the prime factors of the several numbers herein given the square root of the continued product of 105, 231, and 495.

Ans. $105 = 3 \times 5 \times 7$;
 $231 = 3 \times 7 \times 11$;
 $495 = 5 \times 3 \times 3 \times 11$;

$3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 7 \times 7 \times 11 \times 11$;
 $3 \times 3 \times 5 \times 7 \times 11 = 3465$.

717. (a) Multiply 432 by 5.2 and write in words the value of each partial product. (b) Write a number that is at once composite, odd, concrete, denominate, integral, and simple.

Ans. (a) $432 \times 5.2 = 2246.4$; (b) \$9.

718. Find the per cent. of gain when 48 yards of cloth, costing 3s. 6d. a yard, are sold for £10 4s.

Ans. (3s. 6d.) $\times 48 = 168\text{s.}$; (£10 4s.) $= 204\text{s.}$;
 $(204 - 168) \div 168 = .21\frac{1}{2}\%$.

719. Find the total cost of the following bill of goods: $23\frac{1}{2}$ lbs. tea at $47\frac{1}{2}$ cents; 1 bbl. sugar weighing $368\frac{1}{2}$ lbs. at $4\frac{3}{4}$ cents; 69 lbs. coffee at $24\frac{1}{2}$ cents with discount of 6%; and three dozen brooms at 45 cents each with successive discounts of 10% and 5%.

Ans. $\$.475 \times 23.5 = \11.1625 ;
 $\$.0475 \times 368.5 = \17.50375 ;
 $\$.245 \times 69 \times (100 - 6) = \15.8907 ;
 $\$.45 \times 36 \times (100 - 10) \times (100 - 5) =$
 $\$13.861$.
 $\$11.1625 + \$17.50375 + \$15.8907 + \$13.861 =$
 $\$58.43$.

720. Write in figures: (a) Nine million, sixty; (b) Ten thousand and five-tenths; (c) One hundred, three thousand, six hundred five; (d) Six million and six thousandths.

Ans. (a) 9000060; (b) 10000.5; (c) 103605;
 (d) 6000000.006.

721. A peddler bought 491 yards of cloth at 81 cents a yard; he spoiled 29 yards, and sold the rest at 95 cents a yard; did he gain or lose and how much?

Ans. $(491 - 29) \times \$.95 - .81 \times 491 = \41.19 gain.

722. Reduce (a) .00375 to the form of per cent.; (b) $1\frac{1}{2}\%$ to the form of a common fraction; (c) $\frac{15}{640}$ to form of a decimal.

Ans. (a) $.00375 = \frac{3}{8}\%$; (b) $1\frac{1}{2}\% = \frac{7}{800}$; (c)
 $\frac{15}{640} = .0234375$.

723. Write in words: CDIX, MCLIV.

Ans. Four hundred nine; eleven hundred fifty-four.

724. Write in words (a) $\frac{61}{102}$; (b) .451; (c) .00864. Write in arabic notation (d) five hundred and six seven-hundred-twentieths; (e) two hundred twelve thousand eight hundred two.

Ans. (a) Sixty-one hundred-seconds; (b) Four hundred fifty one thousandths; (c) eight hundred sixty-four hundred thousandths; (d) $500\frac{6}{720}$; (e) 212802.

725. Find the cost at \$7.50 per thousand of the brick required for the four walls of a house 30 feet long, 24 feet wide and 18 feet high, walls one foot thick, allowing 21 bricks to the cubic foot and 10% for openings.

Ans. $24 \times 18 \times 2 \times 1 = 1080$; $30 \times 18 \times 2 \times 1 = 864$; $(1080 + 864) \times .10 = 194.4$; $\$7.50 \times (1944 - 194.4) \times 21 \div 1000 = \275.56 .

726. Two men buy a house and lot for \$3650, one pays \$1250 and the other \$2400. Later, they sell the house for \$4380. How much should each receive of the selling price?

Ans. $\frac{1250}{3650} \times \frac{4380}{1} = \1500 ; $\frac{2400}{3650} \times \frac{4380}{1} = \2880 .

727. Reduce 60 rd. 4 yd. 2 ft. to the decimal of a mile (correct to four decimal places).

Ans. $\frac{4\frac{1}{2}}{5\frac{1}{2}} = \frac{14}{3} \times \frac{2}{11} = \frac{28}{33}$ rds.; $60 \frac{28}{33} \div 320 = .1901$.

728. (a) Express in smallest integral numbers the ratio of $\frac{3}{4}$ to $\frac{9}{16}$. (b) Divide an estate of \$8,400 between two heirs in the above ratio.

Ans. (a) $\frac{3}{4} : \frac{9}{16} = \frac{3}{4} \times \frac{16}{9} = \frac{4}{3} = 4 : 3$; (b) $\frac{3}{4} = \frac{12}{16}$; $\frac{12}{16} : \frac{9}{16} = \frac{12}{9} = \frac{4}{3}$; $\$8400 \div 4 = \2100 ; $\$2100 \times \frac{4}{3} = \2800 ; $\$2100 \times \frac{3}{4} = \1575 .

729. Prove that dividing a number by 25 will give the same result as multiplying it by 4 and moving the decimal point two places to the left.

Ans. Let x = the number; $x/25 = .04x$; $1/25 = .04$ when $x = 1$; $5/25 = .2$ when $x = 5$; $6/25 = .24$ when $x = 6$; etc., etc.

730. If a dealer buys goods at "a third off" and sells them at "a fourth off" the list price, what does he gain per cent?

Ans. $100 - (100 \times \frac{1}{3}) = 67\frac{2}{3}$; $100 - (100 \times \frac{1}{4}) = 75$; $75 - 67\frac{2}{3} = 7\frac{1}{3}$.

731. Write in Roman notation 997; 59; 1004; 714.

Ans. CMXCVII; LIX; MIV; DCCXIV.

732. Make a receipted bill of the following: James Brown buys for cash of William Smith 225 lbs. butter @ \$.20; 150 lbs. cheese @ \$.09; 99 doz. eggs @ \$.15; 75 bbls. apples @ \$2.12½?

Ans.

Mr. James Brown,

To WILLIAM SMITH, Dr.

225 lbs. butter.	@	20c.	\$45.00
150 lbs. cheese.	@	9c.	13.50
99 doz. eggs	@	15c.	15.25
75 bbls. apples	@	\$2.12½	159.39

\$233.14

Received Payment,
WILLIAM SMITH.

733. A gentleman after spending $\frac{1}{3}$ of all his money, and $\frac{3}{4}$ of the remainder, had \$177.50 remaining; how much had he at first?

Ans. $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$; $\frac{3}{4} \times \frac{1}{3} = \frac{1}{4}$; $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$; $\frac{5}{12} - \frac{5}{12} = \frac{1}{12}$; \$177.50 = $\frac{1}{12}$; \$177.50 \times 12 = \$2130.

734. Write in Roman characters (as one number): One thousand, eight hundred and ninety-nine.

Ans. MDCCCXCIX.

735. In a certain examination there were 9 candidates 21 years old, 16 candidates 23 years old, 19 candidates 27 years old, 6 candidates 54 years old and 7 candidates 36 years old. Find the average age.

Ans. $(21 \times 9 + 16 \times 23 + 19 \times 27 + 6 \times 54 + 7 \times 36) \div (9 + 16 + 19 + 6 + 7) = 28^{\text{m}} \frac{1}{\text{st.}}$

736. If you commence a piece of work at 9.20 A. M. and have $6\frac{1}{2}$ hours in which to finish, at what time should your work be completed?

Ans. $(9 \text{ hr. } 20 \text{ min.}) + (6 \text{ hr. } 30 \text{ min.}) - 12 \text{ hrs.} = 3 \text{ hrs. } 50 \text{ min.}$

737. A's house is assessed at \$3,000, B's is assessed at \$5,200. A pays \$45 taxes; what does B pay?

Ans. $\$3000 : \$5200 = 45 : x; 3000x = 234000; x = 78.$

738. Of the cost of paving a street 36 feet wide at \$3.85 a square yard, the city pays one-third and the remainder is charged to the property on both sides of the street in proportion to the frontage on the street. Find the cost of the improvement to the owner of a lot of 50 feet front.

Ans. City pays $\frac{1}{3}$; property across the street $\frac{1}{3}$; man pays $\frac{1}{3}$; $36 \times 50 \div 9 \div 3 \times \$3.85 = \$256.67.$

739. A man invested \$2400 in business, and at the end of $2\frac{1}{2}$ years he withdrew the investment and profits, amounting to \$2670. What annual rate did his investment pay?

Ans. $\$2670 - \$2400 = \$270; \$270 \div 2\frac{1}{2} = \108 annual int.; $108 \div 2400 = .045 = 4\frac{1}{2}\%.$

740. A, B and C rent a pasture for \$36. A puts in 4 cows for 8 weeks, B 6 cows for 6 weeks and C 8 cows for 5 weeks. How much rent should each pay?

Ans. A puts in 4 cows for 8 weeks = 32 cows for 1 week; B puts in 6 cows for 6 weeks = 36 cows for 1 week; C puts in 8 cows for 5 weeks = 40 cows for 1 week; total number of cows per week, 108; $\$36 \div 108 = \$33\frac{1}{3}$ per cow; $\$33\frac{1}{3} \times 32 = \10.67 A; $\$33\frac{1}{3} \times 36 = \12 B; $\$33\frac{1}{3} \times 40 = \13.33 C.

741. A man divided \$3,150 between his four sons so that each received \$100 more than the one next younger; how much did each receive?

Ans. $(\$3150 - \$100 - \$200 - \$300) \div 4 =$
 $\$637.50$ first; $\$737.50$ second son; $\$837.50$ third son;
 $\$937.50$ fourth son.

742. Find the sum of the following quantities: $1\frac{3}{5}$,
 $2\frac{1}{8}$, 3.04 , $.08$.

Ans. $1.6 + 2.125 + 3.04 + .08 = 6.845$.

743. Simplify $\frac{3\frac{3}{4} - \frac{2}{7} \times 4.2}{\frac{5}{18} \div \frac{20}{27}}$

Ans. $\frac{2}{7} \times \frac{42}{10} = \frac{6}{5}$; $3\frac{3}{4} - \frac{6}{5} = 2\frac{11}{20}$; $\frac{51}{20} \times$
 $\frac{18}{5} \times \frac{20}{27} = \frac{34}{5} = 6\frac{4}{5}$.

744. Find the cost of the following bill of lumber:
 20 scantlings 14' long 4" wide and 3" thick @ \$30
 per M.; 16 planks 10' long, 14" wide and 2" thick @
 \$20 per M.

Ans. $20 \times 14 \times \frac{1}{8} \times 3 \div 1000 \times 30 = \8.40 ;
 $16 \times 10 \times \frac{1}{4} \times 2 \div 1000 \times 20 = \7.466 ; $\$8.40$
 $+ \$7.466 = \15.87 .

745. A merchant fails with liabilities amounting to
 $\$15,375.20$ and assets inventorying $\$9,760.80$ net. How
 much will a creditor receive on a claim of $\$1,040$?

Ans. $\$9,760.80 \div \$15,375.20 \times \$1,040 = \660.19 .

746. Change (a) $.000\frac{3}{5}\%$ to the form of per cent.; (b)
 $.008\frac{1}{3}\%$ to the form of a common fraction in its lowest
 terms; (c) $\frac{881}{125}$ to the decimal form.

Ans. $a .000\frac{3}{5}\% = \frac{3}{5}\%$; $b .008\frac{1}{3}\% = \frac{1}{120}$; $c \frac{881}{125}$
 $= 7.072$.

747. Find the cost, @ $\$16.50$ per M, of 8 pieces of
 timber each 24' and 8" \times 10".

Ans. $8 \times 24 \times 8 \times \frac{5}{8} = 960$; $960 \div 1000 \times$
 $\$16.50 = \15.84 .

748. What number of men will be required to per-
 form a piece of work in eight days that would take 15
 men 24 days?

Ans. $8 : 24 :: 15 : X$; $\frac{24 \times 15}{8} = 45$.

749. How many gallons of water must be drawn from a reservoir $30\frac{1}{2}$ feet long and $20\frac{3}{4}$ feet wide in order to lower the surface 8 inches.

Ans. $20\frac{3}{4} \times 30\frac{1}{2} \times \frac{2}{3} = 421\frac{11}{12}$ cu. ft.; $421\frac{11}{12} \times 1728 = 729072$; $729072 \div 231 = 3156.15$.

750. A man invested $\frac{3}{8}$ of his money at $3\frac{1}{2}\%$, $\frac{1}{32}$ at 4% and the rest at 6% ; he wishes to put all his money into one investment that will not change the amount of his income. Find what per cent. such an investment must pay.

Ans. \$3200 assumed am't. $\frac{3}{8}$ of 3200 $\times 3\frac{1}{2}\% = \42 ; $\frac{1}{32}$ of 3200 $\times 4\% = \$36$; remainder = \$1100; $\$1100 \times 6\% = \66 ; $\$42 + \$36 + \$66 = \144 ; $144 \div 3200 = 4\frac{1}{2}\%$.

751. Write in Arabic notation a number involving billions and billionths; (b) Express the same number in words.

Ans. 2475367981.037814592; two billion, four hundred seventy-five million, three hundred sixty-seven thousand, nine hundred eighty-one and thirty-seven million, eight hundred fourteen thousand, five hundred ninety-two billionths.

752. Factor 102, 68 and 136. From these factors determine (a) the greatest common divisor, (b) the least common multiple.

Ans. $102 = 2 \times 3 \times 17$; $68 = 2 \times 2 \times 17$; $136 = 2 \times 2 \times 2 \times 17$; G. C. D. = 34; L. C. M. = 408.

753. By selling tea at 60 cents per pound a grocer makes a profit equal to $\frac{1}{7}$ of the cost of the tea. What profit per pound will he make by selling the same tea for 65 cents per pound?

Ans. $\$.60 \div (\frac{1}{7} + \frac{1}{7}) = \$.52\frac{1}{2}$; $\$.65 - \$.52\frac{1}{2} = \$.12\frac{1}{2}$ per lb.

754. Write in Roman notation 59, 1492, 517, 604.

Ans. LIX; MCDXCII; DXVII; DCIV.

755. A man upon his decease left a certain sum of money as follows: One-third to be divided equally between two sons; one-fourth of the remainder to a daughter; the balance to be equally divided among six grandchildren; the grandchildren each received \$750. What was the amount left by the deceased?

Ans. $\frac{2}{3}$ = estate; $\frac{1}{6}$ of $\frac{1}{2}$ = $\frac{1}{12}$ = grandchild; $\frac{1}{2}$ of $\frac{1}{3}$ = $\frac{1}{6}$ = each son; $\frac{1}{12}$ = \$750; $\frac{1}{4}$ of $\frac{2}{3}$ = $\frac{1}{6}$ = daughter; $\frac{1}{12}$ = \$750 \times 12 = \$9000.

756. If, after expending \$821.70 for improvements on a piece of real estate, I sell it for \$6,375, and thereby make a net gain of $11\frac{1}{2}\%$ on the cost, how much did I pay for it?

Ans. $\$6375 \div (1.00 + 11\frac{1}{2}\%) = \5737.50 cost entire; $\$5737.50 - \$821.70 = \$4915.80$.

757. What sum, at 4 per cent. simple interest, will amount to \$221.07 in 3 years, 4 months?

Ans. Int. on \$1 for 3 yrs. 4 mo. = $\$.13\frac{1}{3}$; am't. of int. for 3 yrs. 4 mo. = $\$.13\frac{1}{3}$; $\$221.07 \div \$.13\frac{1}{3} = \$195.06$.

758. Express the term, 6 per cent., in three other ways.

Ans. 6%; .06; $\frac{6}{100}$.

759. Express in figures the following number: two hundred thirty, and forty thousand six hundred five ten millionths.

Ans. 230.0040605.

760. The means of a proportion are $3\frac{1}{2}$ and $\frac{5}{21}$; one of the extremes is $\frac{5}{12}$. Write the proportion and solve it.

Ans. $\frac{5}{12} : 3\frac{1}{2} :: \frac{5}{21} : x$; $\frac{5}{12} x = \frac{5}{4}$; $x = 2$; $\frac{5}{12} : 3\frac{1}{2} :: \frac{5}{21} : 2$; $\frac{5}{6} = \frac{5}{6}$.

761. Write in Roman notation (a) 1326, (b) 969, (c) 2044. Write in Arabic notation MMCXIX and DXCVII.

Ans. MCCCXXVI; CMLXIX; MMXLIV; 1001119; 597.

762. From a hogshead of vinegar 39 gallons 1 quart 1 pint were drawn; what fractional part of the whole remained? [63 gallons = 1 hhd.]

Ans. 39 gal. 1 qt. 1 pt. = $39\frac{3}{4}$ gal.; $63 - 39\frac{3}{4} = 23\frac{1}{4}$; $23\frac{1}{4} \div 63 = \frac{9}{56}$.

763. Reduce (a) to the lowest terms, $\frac{1036}{1332}$; (b) to a decimal $\frac{2}{96}$; (c) to a fraction whose denominator is 21, $\frac{35}{40}$.

Ans. a $\frac{1036}{1332} = \frac{7}{9}$; b $\frac{2}{96} = .020833$; c $\frac{35}{40} = \frac{7}{8}$.

764. A man earned \$17.43 during a week in which he was employed on the different days as follows: $6\frac{1}{2}$ hours, $9\frac{1}{3}$ hours, $5\frac{3}{4}$ hours, $7\frac{1}{6}$ hours and $9\frac{2}{3}$ hours. How much did he receive per hour?

Ans. $6\frac{1}{2} + 9\frac{1}{3} + 5\frac{3}{4} + 7\frac{1}{6} + 9\frac{2}{3} = 38\frac{5}{12}$; $\$17.43 \div 38\frac{5}{12} = \$.432$.

765. A person owned $\frac{5}{8}$ of a mine, and sold $\frac{3}{4}$ of his share for \$1,710; What was the value of the entire mine?

Ans. $\frac{3}{4}$ of $\frac{5}{8} = \frac{15}{32} = \1710 ; $\frac{1}{32} = \$1710 \div 15 = \114 ; $\$114 \times 32 = \3648 .

766. A train traveling 24 miles an hour leaves a station at 1 P. M.; another train traveling 36 miles an hour leaves the same station at 2:45 P. M. At what time will the latter train overtake the former?

Ans. 2 hrs. 45 min. + 3 hrs. 30 min. = 6.15 P. M.

767. Write in Roman notation 119, 38, 96, 1666.

Ans. CXIX; XXXVIII; XCVI; MDCLXVI.

768. Write in Roman notation 47, 319, 99, 573.

Ans. XLVII; CCCXIX; XCIX; DLXXIII.

769. A man leaves his property to his wife, son, and daughter. To the son he leaves $\frac{1}{4}$, to the daughter $\frac{1}{8}$

less than $\frac{1}{3}$, and to the wife the remainder, which was \$590 less than the son and daughter together received. What was the amount of her property?

Ans. $\frac{5}{12} + 180 = \frac{7}{12} - \$180 - \$590; \$950 = \frac{1}{6}; \$5700 = \frac{5}{6}$.

770. A and B hire a pasture for \$60; A puts in it 9 horses and B 12 cows for the same length of time. If 3 cows eat as much as 2 horses, how much ought each to pay? Write full analysis in words.

Ans. If 3 cows eat as much as 2 horses, 1 cow eats $\frac{2}{3}$ as much as 1 horse. 12 cows will eat ($12 \times \frac{2}{3} = 8$) as much as 8 horses. A must pay $\frac{9}{17}$ and B $\frac{2}{17}$ of \$60.

771. What is the ratio of 56 A. 64 sq. rds. 14 sq. yds. to 75 A. 32 sq. rds. 18 sq. yds. 6 sq. ft.?

Ans.
$$\frac{2456910}{3275880} = \frac{3}{4} = 3:4.$$

772. If ten men can excavate a cellar 14 ft. by 12 ft. and 7 ft. deep in a given time, how many men will be required to excavate in the same time a cellar of double the length and breadth with the same depth? NOTE: Solve by proportion.

Ans.
$$\begin{array}{l} 14 : 28 \\ 12 : 24 :: 10 : x; x = 40 \text{ men.} \\ 7 : 7 \end{array}$$

773. Write in Arabic notation (*a*) five hundred two and four thousandths, (*b*) one hundred sixty-thirds. Write in Roman notation 1949.

Ans. *a* 502.004; *b* $\frac{100}{3}$; MCMXLIX.

774. Express in figures one thousand four hundred twenty millionths.

Ans. .001420.

775. A school room is to seat 80 pupils. Allowing 16 square feet of floor space and 250 cubic feet of air space for each pupil, what should be the other dimensions of the room if its width is 32 ft.?

Ans. $16 \times 80 \div 32 = 40$ ft. length; $250 \times 80 \div 16 \times 80 = 15.625$ ft. high.

776. A merchant's assets are \$4675 and his liabilities are \$7854. How much can he pay on a dollar?

Ans. $\$4675 \div 7854 = \$.595$.

777. A grocer sold 50 bbls. of wine, each containing 31 gal. 2 qts., at \$2.40 a gallon, receiving a note at 90 days; what would be the proceeds of this note, discounted at bank at $7\frac{1}{2}$ per cent. per annum?

Ans. $\$2.40 \times 31\frac{1}{2} \times 50 = \3780 . $\$3780 \times .075 \times \frac{90}{360} = \frac{567}{8} = \70.875 . $\$3780 - \$70.875 = \$3709.125$.

778. Write in words, $705,800\frac{13}{10}$; write in figures, eight million eighty-three and nine one-hundredths.

Ans. Seven hundred five thousand, eight hundred and thirteen-nineteenths; 8000083.09.

779. In a certain county institution having 240 inmates, 46 State charges are added temporarily and remain one year for which the State is to pay the cost of maintenance. During the year the farm products raised by the inmates and used in the institution are valued at \$1406.57. Nine of the State inmates worked 125 days each, their labor being valued at 50c. a day. The total cost for maintenance exclusive of the farm products amounted to \$64,950. How much does the State owe the county?

Ans. $125 \times 9 \times .50 = \562.50 ; $\$64950 + \$1406.57 = \$66356.57$; $\$66356.57 \div 286 = \232.016 ; $\$232.016 \times 46 = \10672.736 ; $\$10672.736 - \$562.50 = \$10110.236$.

780. If 3 men can do a piece of work in 8 days of 10 hours each, how many men will be required to do the same work in 6 days of 8 hours each? (Solve by proportion.)

Ans. $6 : 8 :: 3 : x$; $x = 5$.
 $8 : 10$

781. Divide $2\frac{1}{2}$ by $4\frac{2}{7}$, multiply the quotient by $1\frac{1}{4}$, and express the result in the form of a decimal fraction.

Ans. $(\frac{5}{8} \times \frac{7}{10}) \times \frac{3}{4} = \frac{1}{2} = .33\frac{1}{3}.$

782. If milk is 1.03 times as heavy as water, what is the weight of the milk in a can that is 28" in diameter and 3' high? [A cu. ft. of water weighs 62½ lb.]

Ans. 28 dia. = 14 radius; 3 ft. = 36 in. h.; $14 \times 14 \times 3.1416 \times 36 \div 1728 = 5.2760\frac{2}{3}$; $5.2760\frac{2}{3} \times 62.5 \times 1.03 = 339.64679.$

783. Simplify $1 + .0875 \div .058\frac{1}{2} - 2.25 \times 1.5 \times 2.015$

— and reduce the result to an equivalent common fraction.

Ans. $1 + .0875 \div .058\frac{1}{2} - 2.25 \times 1.5 \times \frac{2.015}{4.03} = 4.1875.$

784. The distance around a rectangular field whose width is $\frac{3}{4}$ its length, is 98 rods; find the area of the field.

Ans. $\frac{1}{4} + \frac{3}{4} = \frac{1}{2}$; $\frac{1}{2} = 98$; $\frac{1}{4} = \frac{1}{2} \times \frac{3}{4}$; $= 14$; $\frac{1}{4} = 4 \times 14 = 56$; $\frac{3}{4} = 3 \times 14 = 42$; $42 \times 56 = 2352$; $2352 \div 160 = 14A.112$ sq. rd.

785. If the capacity of a bin 12 ft. by 7 ft. by 4 ft. is 270 bushels, what is the capacity of a bin 8 ft. by $7\frac{1}{2}$ ft. by 6 ft. (Solve by proportion.)

Ans. $\frac{12}{4} : \frac{8}{6} :: 270 : X$; $X = 289\frac{2}{3}.$

786. (a) What is a ratio? A proportion? (b) Give reasons why scholars should form and solve proportions and analyze problems giving rise to proportions. (c) The extremes of a proportion are $\frac{3}{4}$ and .075; one of the means is $\frac{1}{4}$, what is the other mean?

Ans. a A ratio is the relation of one number to another number of the same kind. A proportion is an equality of ratios. b To acquire a power to interpret problems. To save time by cancellation. c $\frac{3}{4} : \frac{1}{4} :: X : .075$. $X = .225.$

787. Reduce 64 ru. 4 yd. 1 ft. to a decimal of a mile, correct to three decimal places.

Ans. 64 rd. 4 yd. 1 ft. = 1069 ft.; $1069 \div 5280 = .202$.

788. Motormen receive $12\frac{1}{2}$ cents an hour and work from 5 A. M. to 5:30 P. M., no noon hour. How much would a motorman receive in $6\frac{1}{2}$ days?

Ans. From 5 A. M. to 5:30 P. M. = $12\frac{1}{2}$ hrs.; $\$.125 \times 12.5 \times 6.5 = \10.12 .

789. In a certain district, school was in session 156 days. 3 pupils were present every day, 9 pupils each attended 154 days, 16 pupils 149 days, 8 pupils 145 days and 7 pupils 98 days. Find the average daily attendance.

Ans. Total attendance $6084 \div 156 = 39$.

790. If a railroad train goes 28 miles in 45 minutes, how far will it go in 6 hours at the same rate?

Ans.
$$\frac{28 \times 6 \times 60}{45} = 224 \text{ miles.}$$

791. 14 bushels is what per cent. of 7 quarts?

Ans. $(32 \times 14) \div 7 = 6400$.

792. If 12 men can reap 80 acres of wheat in 6 days, how long will it take 25 men to reap 200 acres? (Solve by proportion.)

Ans.
$$\begin{array}{l} 25 : 12 \\ 80 : 200 :: 6 : X; X = 7\frac{1}{5} \text{ days.} \end{array}$$

793. If 15 yards of cloth 27 inches wide are required for a dress, how many yards of cloth 30 inches wide will be required? (Solve by proportion.)

Ans. $30 : 27 = 15 : X; X = 13\frac{1}{2} \text{ yds.}$

794. A and B enter into partnership; A furnished \$240 for 8 mo., and B \$559 for 5 mo. They lost \$118; how much did each man lose?

Ans. A. \$54.395; B. \$63.605.

795. Multiply 5.0207 by 807 and from the product subtract $\frac{1}{6}$ of 549.85.

Ans. $5.0207 \times 807 - \frac{1}{8} \times 549.85 = 3941.7349.$

796. A carload of wheat weighing 5 T. 617 lb. is worth how much at 93 cents per bushel (60 lb.)?

Ans. 5T. 617 lb. = 10617 lb. $10617 \div 60 \times .93 = \$164.56.$

797. A and B have the same income; A saves $\frac{1}{8}$ of his but B by spending \$125 a year more than A, finds himself \$100 in debt at the end of 4 years. How much does each spend annually? Give analysis in words.

Ans. If A saves $\frac{1}{8}$ he spends $\frac{7}{8}$ of annual income. B spends $\frac{7}{8} + \$125$ in one year. In 4 yrs. B will spend $\frac{7}{2}$ annual income + \$500. $\frac{7}{2} + \$500 = \frac{8}{2} + \100 ; $\frac{1}{2}$ income = \$400; A spends $\frac{7}{8}$ of \$800 or \$700; B spends $\frac{7}{8}$ of \$800 + \$125 = \$825.

798. Find the longest straight line that can be drawn on the floor of a room which is 12 feet wide and 16 feet long.

Ans. $(12)^2 + (16)^2 = 400$; $\sqrt{400} = 20.$

799. (a) Write in figures (as one number) the following: Eight million, forty thousand and thirteen hundred thousandths.

Ans. 8040000.00013.

800. What will it cost to construct a highway 9 miles, 64 rods, 3 yards long at \$8,500 a mile?

Ans. 9 mi. 64 rd. 3 yd. = $9\frac{7}{352}$ mi.; $\$8500 \times 9\frac{7}{352} = \$78214.49.$

801. The numerator of a fraction is six-fifths of the denominator and the sum of the numerator and denominator is 319; what is the fraction?

Ans. $\frac{6}{5} \div \frac{5}{5} = \frac{6}{5}$; $\frac{6}{5} + \frac{5}{5} = \frac{11}{5} = 319$; $\frac{1}{5}$ of 319 = 29; $\frac{6}{5} = 6 \times 29 = 174$; $\frac{5}{5} = 5 \times 29 = 145.$ $\frac{174}{145}.$

802. (a) Express in the form of a couplet in its lowest integral terms the ratio of 3 in. to 2 rds. (b) Write as a decimal fraction $\frac{3}{8}$ per cent. (c) Write in Arabic notation two million three hundred and four

hundred-thousandths. (d) Write in Roman notation 1902.

Ans. a) 3 in.: $16\frac{1}{2} \times 12 \times 2 = 3 : 396 = 1 : 132$; b) .00375; c) 2000300.0004; d) MCMII.

803. Write in arabic notation (a) four hundred and twenty-five sixty-thirds; (b) six tenths per cent.; (c) three hundred thirty-five millionths; (d) eight hundred-thousandths; (e) forty-five minutes nineteen seconds circular measure.

Ans. a) $400^{\frac{25}{63}}$; b) .006; c) .000335; d) .00008; e) 45' 19".

804. Find the sum of the following quotients: $.95 \div 10$; $200000 \div 20$; $3.65 \div 100$; $100 \div 1000$; $6 \div 60$.

Ans. 10000.3315.

805. If a man buy 2 bushels of chestnuts at \$3. a bushel and sell them at 10 cents a pint, how much does he gain?

Ans. $32 \times 2 \times 2 \times .10 = \12.80 ; $\$3 \times 2 = \6 cost; $\$12.80 - \$6.00 = \$6.80$.

806. Simplify $\frac{25}{18} \times \frac{1^{13}/_{15}}{2^{16}/_{27}} \div \frac{4.375 \div 7/4}{5\frac{3}{4} - 11/8}$

Ans. $1\frac{1}{5}$.

807. The quotient is one-half the divisor. The remainder which is 17, is one-half the quotient. Find the dividend.

Ans. $(68 \times 34) + 17 = 2329$.

808. Reduce $\frac{128}{125}$, $\frac{200}{512}$ and $\frac{250}{320}$ to decimals. Add these decimals and express their sum as a common fraction in its simplest form.

Ans. $2^{1567}/_{8000}$.

809. What decimal of an acre is 25 square rods? What decimal of a mile is 100 feet?

Ans. $25 \div 160 = .15625$; $100 \div 5280 = .018939$.

810. Write with proper abbreviations or conventions (a) five years two weeks, and three gross seven and one-third dozen; (b) in Arabic notation, four hundred and fifteen six-hundredths; (c) in words, 6000.0006.

Ans. (a) 5 yr. 2 wk.; 3 gr. $7\frac{1}{3}$ doz.; (b) $400^{15}/_{600}$; (c) Six thousand and six ten-thousandths.

811. (a) Write in Roman notation nine hundred ninety-nine. (b) Write in Arabic notation two million two thousand two and two ten-thousandths. (c) Write in words .00707. (d) Write in words 301 36-41.

Ans. (a) CMXCIX; (b) 2002002.0002; (c) Seven hundred seven hundred-thousandths; (d) Three hundred one and thirty-six forty-firsts.

812. Find the cost, @ \$.45 a rod, of fencing a $2\frac{1}{2}$ acre lot which is in the form of a rectangle 25 rods long.

Ans. $(160 \times 2\frac{1}{2}) \div 25 = 16 \text{ w.}; (25 \times 2) + (16 \times 2) = 82, \$45 \times 82 = \$36.90.$

813. A farm of 125.4 acres was sold for \$7586.70; what was the price an acre?

Ans. $\$7586.70 \div 125.4 = \$60.50.$

814. Simplify $\frac{\frac{2}{5} + 3\frac{3}{5} \div 4\frac{1}{2}}{4\frac{4}{5} \times \frac{2}{3}}$ and express the result both as a common fraction and as a decimal.

Ans. $\frac{2}{3}$; .375.

815. What per cent. of the whole time of a year of 365 days does a teacher spend in teaching 6 hours a day, 5 days a week, 40 weeks a year, allowing for 4 holidays and 1 week at institute?

Ans. $6 \times 5 \times 40 = 1200 \text{ hrs. total school time}; (4 + 5) \times 6 = 54 \text{ hrs. lost}; 1200 - 54 = 1146$
 hours actual school time; $\frac{1146}{24 \times 365} = .1308 = 13.08\%.$

816. A coal bin is 6 ft. long and 4 ft. wide. One ton of coal occupies 36 cu. ft. of space. Find how deep the bin must be to contain five tons.

Ans. $5 \times 26 = 130$ cu. ft. $180 \div (6 \times 4) = 7\frac{1}{2}$ ft. deep.

817. If a number when divided by 27 gives a remainder of 13, what will be the remainder when divided by 9? Why?

Ans. Remainder is 4; because $13 - 9 = 4$.

818. (a) What per cent. of a pound Avoirdupois is a pound of Troy? (b) What per cent. of an ounce Avoirdupois is an ounce Troy?

Ans. a) $5760 \div 7000 = 82\frac{2}{7}$; b) $7000 \div 5760 = 1.097\frac{1}{4}$.

819. If it cost \$510 to fence a field 72 rd. by 98 rd., what will it cost at the same rate, to fence a square field of the same area?

Ans. $72 \times 98 = 7056$; $\sqrt{7056} = 84$; $84 \times \$1.50 = \126 .

820. Reduce to a common fraction (a) $.05\frac{2}{5}$; (b) to a decimal $\frac{7}{125}$; (c) to per cent. $\frac{7}{500}$; (d) to lowest terms, $\frac{221}{247}$.

Ans. (a) $\frac{27}{500}$; (b) $.056$; (c) 1.4 ; (d) $\frac{17}{19}$.

821. Simplify $\frac{\frac{7}{15} + 1\frac{1}{2} \times \frac{2}{5} + \frac{1}{8}}{1 \div (\frac{5}{4} - \frac{1}{15})}$ and express

the result both as a common fraction and as a decimal fraction.

Ans. $\frac{713}{800}$; .89125.

822. How much will it cost to make an excavation 40 ft. long, 30 ft. wide, and 9 ft. deep, at 32 cts. per cubic yd.?

Ans. $\frac{40 \times 30 \times 9}{27} \times .32 = \128 .

823. Find the total amount available for amusement in a hospital having a census of 2750 patients from December 1 to February 1 inclusive, the allowance being $2\frac{1}{2}$ c. per week per capita.

Ans. Dec. 1 to Feb. 1 = 63 da. = 9 wks.; $\$.025 \times 2750 \times 9 = \618.75 .

824. A certain State institution represents an investment of \$486,890. During 1902 the expenses for its maintenance were \$8,465.75 for repairs, \$46,710 for salaries of officers and employees, and \$213,674.29 for all other expenses. The average number of inmates was 1681. Allowing 3% on the original investment, find the weekly average cost per capita for the year.

Ans. $\$254243.34$ total cost $\div 1681 = \$1512.34$; $\$1512.34 \div 52 = \28.08 .

825. Reduce to integers of other denominations (a) .125 of a barrel (b) 201458 inches.

Ans. (a) 3 gals. 3 qts. 1 pt. 1 gill; (b) 3 mi. 59 rds. 3 yds. 2 ft. 2 in.

826. How much cloth does a customer get who pays for 15 yds. measured by a yard stick $\frac{3}{4}$ in. short?

Ans. $\frac{3}{4} \times 15 = 4\frac{3}{4} = 11\frac{1}{4}$ inches. 15 yds. — $11\frac{1}{4}$ inches = 14 yds. 2 ft. $\frac{3}{4}$ in.

827. Reduce the compound couplet
$$\begin{array}{r} 3 : 7 \\ 22 : 5 \\ 7\frac{1}{2} : 33 \end{array}$$

to a simple couplet in its lowest terms.

Ans.
$$\frac{7 \times 5 \times 33}{3 \times 22 \times 15} = \frac{7}{3} = 7 : 3.$$

828. A owns $\frac{3}{5}$ of a piece of land; B owns $\frac{2}{5}$ of it. A's share is worth \$3145.17 more than B's. What is the value of the land?

Ans. $\frac{3}{5} - \frac{2}{5} = \frac{1}{5} = \frac{17}{45} = 3145.17$; $\frac{1}{45} = \frac{1}{17}$ of $3145.17 = 185.01$; $\frac{45}{45} = 45 \times 185.01 = \8325.45 .

829. The assessed valuation of a certain school district is \$123,900, upon which a tax amounting to \$198.24 must be raised. What is the tax on a farm assessed at \$1,480?

Ans. $\$198.24 \div 123900 \times 1480 = \$2.45\frac{1}{2}$.

830. Express in simplest integral form the couplet $\frac{4}{7} : 2\frac{2}{3}$.

Ans. $\frac{4}{7} \div 2\frac{2}{3} = \frac{4}{7} \times \frac{3}{8} = \frac{1}{14} = 3 : 14$.

831. Write in words 700.009.

Ans. Seven hundred and nine thousandths.

832. Write (a) in Arabic notation, five thousand seven hundred thousandths; (b) in words, $800.003\frac{1}{3}$; (c) in words, MCDLXXXIX.

Ans. (a) 5.700; (b) Eight hundred and three and one-third thousandths; (c) Fourteen hundred eighty-nine.

833. What is the value of a field 65 rd. long and 36 rd. wide at \$74.25 per acre?

Ans. $\frac{65 \times 36}{160} \times 74.25 = \1085.91 .

834. How much green tea at 57 cents a lb. should be mixed with black tea at 47 cents a lb. to make 100 lbs. of mixed tea worth 50 cents a lb.?

Ans. $50 = 57 - 7$; $50 = 47 + 3$; green, $\frac{3}{3+7}$
 $\times 100 = 30$; black, $\frac{7}{3+7} = 70$.

835. A mechanic earns \$85 a month; his expenses are \$712 a year. How long will it take him to save enough to buy a house worth \$2650?

Ans. $\$2650 \div (85 \times 12 - \$712) = 8.6\frac{2}{11}$ yrs.

836. The distance from New York to Albany is 143 miles. A train leaves New York for Albany at 8:30 A. M. running 52 miles an hour and another leaves Albany for New York at 9:15 A. M. running 45 miles an hour. At what time and how far from Albany will the trains meet, assuming their speed to be constant?

Ans. $48\frac{24}{97}$ miles from Albany; 10 hrs. 19 min. $19\frac{7}{97}$ secs. A. M.

837. What common fraction at its lowest terms is equal to each of the following respectively: $12\frac{1}{2}\%$, $16\frac{2}{3}\%$, $.375$, $.33\frac{1}{3}$.

Ans. $12\frac{1}{2}\% = \frac{1}{8}$; $16\frac{2}{3}\% = \frac{1}{6}$; $.375 = \frac{3}{8}$; $.33\frac{1}{3} = \frac{1}{3}$.

838. If $8\frac{3}{4}$ cwt. of sugar cost $\$65\frac{1}{2}$, what will $11\frac{1}{2}$ cwt. cost? (Solve by proportion.)

Ans. $8\frac{3}{4} : 11\frac{1}{2} = 65\frac{1}{2} : X$; $\frac{31}{8} \times \frac{23}{2} \div \frac{33}{8} = 85.15$.

839. Write in Roman notation 1903; 244; 71; 597.

Ans. MCMIII; CCXLIV; LXXI; DXCVII.

840. Find to two places of decimals the diagonal of a square whose sides is 15 ft.

Ans. $(15)^2 + (15)^2 = 450$; $\sqrt{450} = 21.21$ ft.

841. Simplify the expression $\frac{6\frac{1}{4} + 8\frac{1}{3} \times \frac{3}{4}}{5\frac{3}{4} \times .025}$

Ans. $80\frac{2}{11}$.

842. A garden 145 feet long and 120 feet wide is inclosed by a tight board fence 6 feet high; find the cost, @ 8c. a square yard, of painting both sides of the fence.

Ans. $\frac{145 \times 6 \times 2 + 120 \times 6 \times 2}{9} \times 2 = 706\frac{2}{3}$; $\$.08 \times 706\frac{2}{3} = \$56.53\frac{1}{3}$.

843. Write in Roman notation, 1919; in Arabic notation, five hundred thousand and five hundred thousands; in words, \$18018180.18.

Ans. MCMXIX; 500000.005; eighteen million, eighteen thousand, one hundred eighty dollars and eighteen cents.

844. Write a number consisting of two units of the sixth integral order, eight of the fourth, two of the first decimal order and eight of the third. Express the same number in words.

Ans. 208000.208; two hundred eight thousand and two hundred eight thousandths.

845. The volume of a room is 2,295 cubic feet, the height 9 feet, and the width 15 feet. (a) Find the length. (b) Which way of the room should carpet one yard wide be laid to prevent waste? (c) What is saved over laying it the other way, carpet costing 90c a yard?

Ans. a) 17 ft.; b) lengthwise; c) \$1.50.

846. Find the cost, @ \$16.50 per M, of 8 pieces of timber each 24' long and 8" \times 10".

Ans. $8 \times 24 \times 8 \times \frac{5}{8} = 1280$; $\$16.50 \times 1280 \div 1000 = \21.12 .

847. From four hundred four thousand subtract four hundred and four thousandths.

Ans. 403999.596.

848. Write in Roman notation 95, 142, 369, 1895.

Ans. XCV; CXLII; CCCLXIX; MDCCCXCV.

849. A captain of a ship when crossing the equator finds that the solar time is 28 minutes 36 seconds past 3 P. M.; by his chronometer, set at Greenwich, it is 34 minutes 50 second past 11 A. M. Find how many miles the ship is from the meridian of Greenwich. [At the equator $1^\circ = 69.16$ statute miles.]

Ans. (3 hr. 28 min. 36 sec. — 11 hr. 34 min. 50 sec.) $\times 15 = 58^{\text{th}}_{/120^\circ}$; $69.16 \times 58^{\text{th}}_{/120^\circ} = 4041.83$ miles.

850. On a certain day the mercury stood as follows: From 6 till 9 A. M., 76° ; from 9 A. M. till 2 P. M., 80° ; from 2 to 4 P. M., 78° ; from 4 till 7 P. M., 77° ; from 7 P. M. till 6 A. M. the next day, 72° . Find the mean temperature of the day.

Ans. 6 till 9 = 3 hrs., $3 \times 76 = 228$; 9 till 2 = 5 hrs., $5 \times 80 = 400$; 2 till 4 = 2 hrs., $2 \times 78 = 156$; 4 till 7 = 3 hrs., $3 \times 77 = 231$; 7 till 6 = 11 hrs., $11 \times 72 = 792$; $(228 + 400 + 156 + 231 + 792) \div (3 + 5 + 2 \times 3 + 11) = 75.29^\circ$.

851. From a 10 gallon keg of wine 2 gallons are drawn and the keg filled with water; from this mixture 2 gallons are again drawn and the keg again filled with water. What per cent. of water does the mixture now contain?

Ans. 1, 10 gals. = 100% wine, 2 gals. = 20% wine; 2, 10 gals. = 80% wine + 20 water, 2 gals. = 16% wine + 4 water; 3, 10 gals. = 64% wine + 20 water + 16 water, 100% - 64% = 36% water.

852. If stock bought at 20% premium pays 5% on the investment, what would it pay if bought at 20% discount? Explain.

Ans. If \$100 is assumed price, the buying price is 120% of \$100 or \$120, 5% of \$120 = \$6 dividends. If bought at 20% discount or \$80 the rate of dividend = \$80 divided into \$6 = $7\frac{1}{2}\%$.

853. If 2 men and 1 boy can dig 55 bushels of potatoes in a day and 2 boys and 1 man can dig 50 bushels, how many bushels can 1 man dig?

Ans. 20 bu.

854. 5 gal. 2 qt. is what per cent. of 3 bbl.?

Ans. 3 bbl. = 378 qts.; 5 gal. 2 qts. = 22 qts.; $22 \div 378 = .0582 = 5.82\%$.

H. Advanced Arithmetic, Square Root, Cube Root, Mensuration.

855. Find the square root of 43 to three decimal places.

Ans. 6.556.

856. Separate the number 7,056 into its prime factors and from these factors determine its square root.

Ans. $7056 = 2.2.2.2.3.3.7.7 = 84$.

857. Extract the square root of 579.942724.

Ans. 24.082.

858. Assuming that a cubic foot of water weighs $62\frac{1}{2}$ pounds, find the pressure on a square inch at the bottom of a tank 8 feet deep.

Ans. $1 \times 1 \times 96 \div 1728 \times 62\frac{1}{2} = 3''\frac{1}{8}$ lbs.

859. The hypotenuse of a right-angle triangle is $16\frac{1}{2}$ inches and the perpendicular $11\frac{1}{2}$ inches. Find the base. (Correct to two decimal places.)

Ans. $(\frac{33}{2})^2 - (\frac{23}{2})^2 = 140$; $\sqrt{140} = 11.83$.

860. The base and hypotenuse of a right angled triangle are 14 feet and $26\frac{1}{2}$ feet respectively. Find the perpendicular.

Ans. $(26.5)^2 - (14)^2 = 506.25$; $\sqrt{506.25} = 22.5$.

861. (a) The area of a triangle is 16 sq. in. and its altitude is 10 in. What is its base? (b) The diagonal of a square is 20 ft.; find the area of the square.

Ans. a) $16 = \frac{1}{2} \times 10 \times \text{base} = 5 \times \text{base}$; $\frac{16}{5} = \text{base} = 3\frac{1}{5}$. b) $(20)^2 \div 2 = 200$; $\sqrt{200} = 14.1$ one side; $(14.1)^2 = 200$ area.

862. Find the square root of $\frac{2}{3}$, correct to thousandths.

Ans. $\frac{2}{3} = .6666667$; $\sqrt{.6666667} = .816$.

863. How many quarts does a pail hold that is 1 foot in diameter at the top, 10 inches in diameter at the bottom and 9 inches deep?

Ans. $3.1416 \times 6 \times 6 = 113.0976$, $3.1416 \times 5 \times 5 = 78.54$; $113.0976 \times 78.54 = 8882.685504$; $\sqrt{8882.685504} = 94.24$; $113.0976 + 78.54 + 94.24 = 285.6312$; $285.6312 \times 3 \div 57.75 = 14.85$. 1 qt. = 57.75 cu. in.

864. A tree, 68 feet high, and standing on level ground, was partly broken off by the wind, at such a height that $\frac{2}{3}$ of the part broken off is equal to $\frac{3}{4}$ of the part left standing. How far from the base of the tree did the top strike the ground.

Ans. $\frac{2}{3} = \frac{3}{4}$, $\frac{1}{3} = \frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$, $\frac{3}{8} = 3 \times \frac{3}{8} = \frac{9}{8}$; $\frac{9}{8} = \text{part standing}$, $\frac{9}{8} + \frac{3}{8} = \frac{12}{8} = 1\frac{1}{2}$, $\frac{1}{2} = \frac{1}{17} \times \frac{17}{2} = 4$; $\frac{3}{8} = \text{part broken}$, $\frac{3}{8} = 36$, $\frac{3}{8} = 32$; $(36)^2 - (32)^2 = 272$, $\sqrt{272} = 16.49$.

865. Find the radius of a sphere equal in volume to the sum of three spheres whose radii are respectively 9 inches, 12 inches and 15 inches.

Ans. $\frac{1}{2} \times 3.1416 \times 9 \times 9 \times 9 = 3054.3642$; $\frac{1}{2} \times 3.1416 \times 12 \times 12 \times 12 = 7239.9744$; $\frac{1}{2} \times 3.1416 \times 15 \times 15 \times 15 = 14140.5750$; $3054.3642 + 7239.9744 + 14140.5750 = 24434.9136$; $24434.9136 = \frac{1}{2} \times 3.1416 R^2$; $R^2 = 24434.9136 \div \frac{1}{2} \times 3.1416 = 5832$; $R = \sqrt{5832} = 18$ in.

866. When the mercury in the barometer is 30 inches high, the pressure of air is 15 pounds to a square inch; find the pressure on a pane of glass 2 feet square when the mercury column is 28 inches high.

$$\text{Ans. } \frac{(24)^2 \times 28 \times 15}{30} = 8064.$$

867. Find the square root of 3 to *three* decimal places.

Ans. 1.732.

868. Find the 4th power of $2\frac{1}{2}$.

$$\text{Ans. } \frac{5}{2} \times \frac{5}{2} \times \frac{5}{2} \times \frac{5}{2} = \frac{625}{16} = 39\frac{1}{16}.$$

869. Find the two equal factors which will produce 299.29.

Ans. 17.3.

870. Find the square root of 17.3056.

Ans. 4.16.

871. Extract the square root of 2 to four decimal places.

Ans. 1.4142.

872. Find the square root of .049 correct to two decimal places.

Ans. .22.

873. Find the square root of 129.2769.

Ans. 11.37.

874. The distance around a circular park is 314.16 rods; find the area of the park.

Ans. $2 \pi R = 314.16$; $R = 314.16 \div 3.1416 \times 2 = 50$. Area $= \pi R^2 = 3.1416 \times 2500 = 7854$; $7854 \div 160 = 49$ A., 14 sq. rd.

875. If $\frac{1}{5}$ of the time past noon is the time to midnight, what is the time?

Ans. 6.40 P. M.

876. Find to the nearest inch, the size of the largest square stick of timber that can be cut from a circular log 2 feet in diameter. Find the number of board feet in the stick of timber if it is 12 feet long, no allowance being made for waste.

Ans. $1 + 1 = 2 =$ square of side; $\sqrt{2} = 1.414$; $12 \times 1.414 = 16.968$ in. $=$ side; $16.968 \times 1.414 \times 12 = 287.913$.

877. Find one side of a square whose area is 10.5625 square feet.

Ans. 3.25 ft.

878. The capacity of a cylindric vessel 18 inches high is two cubic feet; find the diameter of the vessel.

Ans. $192 =$ area of base; $192 \div 3.1416 = 61.115355 = R^2$; $2 \sqrt{61.115355} = 15.634$.

879. Determine the square root of the product of $12 \times 7 \times 28 \times .03$, by factoring.

Ans. $12 = 2 \times 2 \times 3$
 $7 = 7$
 $28 = 2 \times 2 \times 7$
 $3 = 3$
 $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 7$

 $2 \times 2 \times 5 \times 5 = 42/5 = 8\frac{2}{5}$.

880. The entire surface of cubic block is 384 square feet. How many one-foot cubes can be cut from the block, allowing nothing for waste?

Ans. $384 \div 6 = 64$, $\sqrt{64} = 8$ ft. on a side: $8 \times 8 \times 8 = 512$ cu. ft.

881. Find the square root of 1.5129. Find the cube root of 19683.

Ans. a) 1.23; b) 27.

882. A liquid which is 2.15 times as heavy as water fills a cube whose diagonal is 30 cm. in length. What is the weight of the liquid?

Ans. $(30)^2 \div 3 = 300$; $(\sqrt{300})^3 = 5196.24$; $5196.24 \times 2.15 = 11171.916$ grains.

883. The side of a square inscribed in a circle is 10 ft. Find both the diameter and the area of the circle.

Ans. $10^2 = 100$; $100 \div 2 = 50$; $\sqrt{50} = 7.07 =$ radius; $7.07 \times 2 = 14.14$ diam.; $50 \times 3.1416 = 157.08 =$ area.

884. Separate the number 6,765,201 into four equal factors.

Ans. $\sqrt{6765201} = 2601$; $\sqrt{2601} = 51$.

885. A cylindrical stone pillar 10 ft. high weighs 20 tons; find its diameter, assuming that the stone weighs 195.32 lbs. per cubic foot.

Ans. $2000 \times 20 = 40,000$ lbs.; $40000 \div 195.32 = 204.79$ cu. ft.; $204.79 \div 10 = 20.479$ sq. ft. area of base; $20.479 = \pi R^2$; $20.479 \div 3.1416 = R^2 = 6.50$; $R = \sqrt{6.50} = 2.5049$; $2.5049 \times 2 = 5.0098$.

886. A rectangular field which is $7\frac{1}{2}$ times as long as wide contains 30 acres. What is the distance around the field? What would be the distance around a circular field of the same area?

Ans. a) 429.93 rds.; b) 243.159 rds.

887. Find the square root of 7 correct to *three* decimal places.

Ans. 2.645.

888. Find the sum of the infinite series 16, 8, 4, etc.

Ans.
$$\frac{16}{1 - \frac{1}{2}} = 32.$$

889. What distance will be saved by traveling diagonally across a square mile instead of around the two sides?

Ans. $(320)^2 + (320)^2 = 204800$; $\sqrt{204800} = 450.25$ dia.; $320 \times 2 = 640$ around; $640 - 450.25 = 189.75$.

890. An unsupported body will fall 16.08 feet during the first second, and in each succeeding second 32.16 feet farther than in the preceding second; how far will the body have fallen at the end of 12 seconds?

Ans. $l = a + (u - 1) d$; $l = 16.08 + 11 \times 32.16$; $l = 369.84$ ft.; $s = u/2 (a + l)$; $s = 6 (16.08 + 369.84)$; $s = 2315.52$ ft.

891. After an hour's regular run, an accident delayed a train an hour, and by running $\frac{3}{4}$ of its rate after that it delivered its passengers 3 hours late. Had the delay occurred 120 mi. further on, it would have been only two hours late. Get length of line.

Ans. It loses 2 hrs. by running $\frac{3}{4}$ rate, which means it ran 4 hrs. to go 3 hrs.' distance; hence 1 hr. is lost for each 3 hrs. schedule time, and 2 hrs. is lost in $2 \times 3 = 6$ hrs. schedule time from time accident occurred; $6 + 1 = 7$ hrs., whole schedule time. By second condition, the train would have gone $120 \div \frac{3}{4} = 160$ mi., her regular distance, which is $160 - 120 = 40$ mi. farther than it did, and it would have gone the 40 mi. in $3 - 2$ hrs. = 1 hr.; hence $40 \div 1 = 40$ mi. per hr. schedule rate. Then $7 \times 40 = 280$ mi., length of line.

892. A piano dealer instructed his clerk to mark a piano so that by allowing a discount of 25% he would realize a profit of $33\frac{1}{3}\%$. By mistake he marked the piano at \$300, thereby producing a loss of $16\frac{2}{3}\%$ on the sale. What was the intended marking price and what was the loss?

Ans. $100\% =$ cost piano. To realize a profit of $33\frac{1}{3}\%$, it must be sold at $100\% + 33\frac{1}{3}\%$ or $133\frac{1}{3}\%$ of cost price. But the dealer desires to mark it so as to make a reduction of 25%. $100\% =$ marked price. $100\% - 25\% = 75\%$, selling price. $75\% = 133\frac{1}{3}\%$; $100\% = \frac{100}{75}$ of $133\frac{1}{3}\%$ = $166\frac{2}{3}\%$ of cost price. But it was marked \$300, and a loss of $16\frac{2}{3}\%$ was sustained. $\$300 = 100\% - 16\frac{2}{3}\%$ or $83\frac{1}{3}\%$ of cost. $83\frac{1}{3}\% = \$300$; $100\% = \$360$, cost. $166\frac{2}{3}\%$ of cost price = marked price. $\therefore 166\frac{2}{3}\% = 166 \times (300 \div 83\frac{1}{3}) = \480 , marked price.

893. Find the cost, @ 12c. a square yard, of painting a stage in the form of a trapezoid whose parallel sides, 25' apart, are respectively 28' and 22'.

$$\text{Ans. } (28 + 22) \div 2 \times 25 \div 9 \times .12 = \$8.33\frac{1}{3}.$$

894. Find how many gallons of oil a cylindric cask will hold that is 18" high and 11" in diameter. [1 gallon = 231 cubic inches.]

$$\text{Ans. } \pi \times \frac{1}{2} \times \frac{1}{2} \times 3.1416 \times 18 \div 231 = 7.4052.$$

895. If a sphere of lead 4 inches in diameter is hammered out into a circular disk 8 inches in diameter, how thick will the disk be?

$$\text{Ans. } 4 \times 4 \times 4 \times 3.1416 \times \frac{1}{6} = 4 \times 4 \times 3.1416 \times X; X = \frac{2}{3}.$$

896. A flag-pole 12 inches in diameter at the bottom and tapering to a point is 80 feet long. How many cubic inches of wood in it?

$$\text{Ans. } 6 \times 6 \times 3.1416 \times \frac{1}{3} \times 80 \times 12 = 36190.232.$$

I. Metric System.

897. A cistern 4 meters by 25 decimeters by 2 meters is supplied by a pipe which discharges 50 liters per minute; how long will it take to fill the cistern?

$$\begin{aligned} \text{Ans. } 40 \times 25 \times 20 &= 20000 \text{ cu. dm.} = 20000 \text{ l.} \\ 20000 &= 6 \text{ hr. } 40 \text{ min.} \\ 50 \times 60 & \end{aligned}$$

898. How many liters will a tank hold that is $1\frac{1}{2}$ meters long, $\frac{3}{4}$ meter wide and $\frac{1}{3}$ meter deep?

$$\text{Ans. } 15 \times 7.5 \times 3\frac{1}{3} = 375 \text{ cu. dm.}$$

899. Find the weight of a bar of iron $6\frac{1}{2}$ centimeters wide, 26 millimeters thick and 40 centimeters long, iron being 7.8 times as heavy as water.

$$\text{Ans. } 6.5 \times 2.6 \times 40 = 676 \text{ cu. cm.}; 676 \times 7.8 = 5272.8 \text{ g.}$$

900. An excavation is to be made for a cellar whose dimensions are 36.6 M. long, 19.64 M. wide, and 3.7 M.

deep; what will be the expense of the work, at 15 cents per stere?

$$\text{Ans. } 36.6 \times 19.64 \times 3.7 \times .15 = \$398.94 +$$

901. A rectangular tank 2 meters 5 decimeters long and 1 meter 4 decimeters wide holds 28.7 hectoliters; find the depth of the tank.

$$\text{Ans. } \frac{28.7 \times 100}{25 \times 14} = 8.2 \text{ dm.} = .82 \text{ m.}$$

902. A tank is $2\frac{1}{2}$ meters long, 80 centimeters deep and 5 decimeters wide; find the capacity of the tank in liters and the weight in kilograms of the water required to fill the tank.

$$\text{Ans. } 25 \times 8 \times 5 = 1000 \text{ cdm.} = 1000 \text{ l; } 1000 \text{ cu. dm.} = 1000000 \text{ cu. cg.} = 1000 \text{ Kg.}$$

903. Find the cost of papering a room 11 meters 2.5 decimeters long, 6 meters 1 decimeter wide, 4 meters 25 centimeters high, with paper 75 centimeters wide, at 6 cents a meter.

$$\text{Ans. } \$12.79 +$$

904. Find the equivalent of 6 cu. of wood in denominations of the metric system. (1 cu. m. = 1 ster = 35.316 cu. ft.)

$$\text{Ans. } \frac{128 \times 6}{35.316} = 21.746.$$

905. A tank is 6 meters long, 4.5 meters wide and 9.5 decimeters high. How many liters of water will it contain?

$$\text{Ans. } 6 \text{ m.} = 60 \text{ dm.; } 4.5 \text{ m.} = 45 \text{ dm.; } 60 \times 45 \times 9.5 = 25650 \text{ cu dm.} = \text{l.}$$

906. Express as meters and add 475 dm., 3241 cm., 725 mm.

$$\begin{array}{r} \text{Ans. } 47.5 \\ 32.41 \\ .725 \\ \hline 80.635 \text{ meters.} \end{array}$$

907. A meter is 39.37 inches long; find the length in rods of a kilometer.

Ans. $1000 \times 39.37 = 39370$ in. in Km.; $16\frac{1}{2} \times 12 = 198$ in. in rd.; $39370 \div 198 = 198.838$.

908. Add 25 meters, 8.94 meters, 25 decimeters, and write the result in words.

Ans. $25 + 8.94 + 2.5 = 36.44$; thirty-six meters, four decimeters, four centimeters.

909. One edge of a cubic block of marble is 8 decimeters 2 centimeters long; marble is 2.7 times as heavy as water. Find the weight in kilograms of the block.

Ans. $82 \times 82 \times 82 = 551368$ cu. cm. or g's water; $551368 \times 2.7 = 1488693.6$ g's marble = 1488.6936 Kg.

910. Find the weight in kilograms of a stone 1 meter square and .4 of a meter thick, assuming that the stone is $2\frac{1}{2}$ times as heavy as water.

Ans. $100 \times 100 \times 40 = 40000$ cu. cm. or g's water; $40000 \times 2.5 = 100000$ g's stone = 1000 Kg.

911. Find the cost, @ 35c. a square meter, of plastering the walls and ceiling of a room 6 meters 6 decimeters long, 5 meters 5 decimeters wide and 2 meters 8 decimeters high.

Ans. $6.6 \times 5.5 = 36.30$ ceiling; $6.6 \times 2.8 \times 2 = 36.96$ sides; $5.5 \times 2.8 \times 2 = 30.80$ ends; $(36.30 + 36.96 + 30.80) \times .35 = \36.421 .

912. Find the cost, @ 4c. a liter, of the milk in a vat which is 1.5 meters long, 8 decimeters wide and 4 decimeters deep.

Ans. $(15 \times 8 \times 4) \times .04 = \19.20 .

913. A cistern 2.5 m. by 3.6 m. contains 14 kiloliters of water; how deep is the water?

Ans. $\frac{1000 \times 14}{25 \times 36 \times 1} = 15\frac{5}{9} = 1.5\frac{5}{9}$.

914. A bin 2 meters 6 decimeters long and 1 meter 5 decimeters wide, contains 2535 liters of wheat; find the depth of the bin.

$$\text{Ans. } \frac{2535}{26 \times 15 \times 1} = 6.5 \text{ dm.} = .65 \text{ m.}$$

915. How many blocks 2 decimeters long and 12 centimeters wide will be required to pave a court 14 meters \times 10.8 meters?

$$\text{Ans. } \frac{140 \times 108}{2 \times 1.2} = 6300.$$

916. Find the weight, in kilograms, of the water in a tank 3 meters long, 2 meters wide and 1 meter 6 decimeters deep.

$$\text{Ans. } 300 \times 200 \times 160 = 9600000 \text{ g.} = 9600 \text{ Kg.}$$

917. In 25 kilogrammes how many pounds, Troy weight? (1 gramme = 15.432 gr.)

$$\text{Ans. } \frac{25 \times 1000 \times 15.432}{5760} = 66.979.$$

918. A wheel is 5.6 meters in circumference; how many times will it revolve in rolling a distance of 28 kilometers?

$$\text{Ans. } \frac{28 \times 1000}{5.6} = 5000.$$

919. Write 3 kilometers, 5 liters, 8 deciliters as a single number, denoting liters.

$$\text{Ans. } 3005.8.$$

920. A vat 1.5 meters long, 9 decimeters wide and 8 decimeters deep is full of water; find in kilograms the weight of the water.

$$\text{Ans. } \frac{150 \times 90 \times 80}{1000} = 1080 \text{ Kg.}$$

921. A single track railway connects two places $266\frac{2}{5}$ kilometers apart; how many rails $9\frac{1}{4}$ meters long will it require?

$$\text{Ans. } \frac{266.4 \times 1000}{9.25} = 288 \text{ one side; } 288 \times 2 = 576.$$

922. Find the contents in liters of a bin 4.3 meters long, $33\frac{3}{4}$ decimeters wide and 281 centimeters deep.

$$\text{Ans. } 43 \times 33.4 \times 28.1 = 40357.22.$$

923. If one bushel = 35.236 cu. decimeters, how many bushels would be contained in a bin 5 meters long, 1 meter wide and $1\frac{1}{2}$ meters deep? Give answer to 3 decimal places.

$$\text{Ans. } \frac{50 \times 10 \times 15}{35.236} = 212.8504 \text{ bu.}$$

924. A room which is 6.5 meters long by 4.5 meters wide is to be covered with carpeting 7.5 decimeters wide; how many meters in length of carpet will be required? (Make no allowance for matching figures.)

$$\text{Ans. } \frac{6.5 \times 4.5}{.75} = 39 \text{ m.}$$

925. How much oil can be contained in a rectangular tank, 1 meter 45 centimeters long, $\frac{3}{4}$ meter wide and 30 centimeters deep?

$$\text{Ans. } 14.5 \times 7.5 \times 3 = 326.25 \text{ cu. dm.} = 326.25 \text{ l.}$$

Requirements for Civil Service Positions and Schemes of Examinations.

I. IN NEW YORK STATE.

SPECIAL AGENT, DEPARTMENT OF EXCISE.—\$1,000 to \$1,500. Open to men only. Candidates must not have been engaged in the manufacture or sale of malt or spirituous liquors within two years prior to the time of application. Subjects of examination and relative weights: Spelling, 1; writing from memory the substance of orders dictated orally, 2; handwriting, 2; arithmetic (fundamental rules, fractions and United States money), 1; liquor tax law and questions on the duties of the position, including letter-writing and preparation of reports, 2; age, education, experience and personal qualifications, 2.

COURT ATTENDANT; COURT OFFICER.—Examinations under these titles are held in the counties subject to the State civil service rules and cover appointments in the Supreme Court, Court of General Sessions, County Courts, and Surrogates' Courts in those counties. Salaries vary in different counties from \$720 to \$1,500. Subjects of examination and relative weights: Spelling, 1; writing from memory the substance of verbal orders, 2; copying from plain copy, 1; arithmetic (fundamental operations, fractions and United States money), 1; questions on the duties of the position, civil government and knowledge of court business, 3; experience, education and personal qualifications, 2.

BOOKKEEPER.—Open to men and women. Salaries usually from \$600 to \$1,200. Time allowed, eight hours. Subjects of examination and relative weights: Spelling, 1; penmanship, 1; rapid computation, 2; theory and practice of bookkeeping and commercial arithmetic, 4; experience, 2.

CHAINMAN.—\$2.50 to \$3 a day. Subjects of examination and relative weights: Arithmetic, mensuration and use of chain, 8; experience and education, 2.

CLERK.—Open to men and women. Minimum age, 21 years. Salaries usually from \$720 to \$1,200. This examination covers all positions as clerk, copyist, and general office employee in State and county offices, departments and institutions not subject to special examination. See subjects of examination below.

JUNIOR CLERK.—Open to both sexes. Minimum age, 16 years. Successful competitors will be eligible for original appointment at salaries not exceeding \$600. Persons over 21 years of age may apply for clerk and junior clerk in the same application and *should do so* if they desire to be eligible for positions at salaries of \$600 or less. The list of junior clerks will be certified for all positions at salaries not exceeding \$600, and the list of clerks for all positions at higher salaries.

Subjects of examination and relative weights for clerk and junior clerk: Spelling (fifty words of more than average difficulty), 3; arithmetic, — accuracy, 3; time, 1; letter-writing (choice of two assigned subjects), 3; penmanship (rated from exercise in plain copy), 4; copying from plain copy and rough draft, 3; time consumed in writing the whole examination except spelling, 3.

DEPUTY FACTORY INSPECTOR.—\$1,000 to \$1,200. Open to men and women. Subjects of examination and relative weights: Arithmetic (fundamental rules, fractions, decimals and measures), 1; questions on laws relating to the department, 2; questions on the nature and methods of factory and tenement house inspection, preparation of reports, etc., 5; experience and education, 2. In marking experience due weight is given to age and to experience in mechanical trades, in the operation of factories or mills or any other employments especially related to the work of the position, and to ability to speak languages other than English. Spelling, handwriting and manner of expression are con-

sidered in marking the papers, but do not constitute separate subjects.

EXAMINER, EDUCATION DEPARTMENT.—Open to men and women. These examinations are held to provide eligible lists for permanent appointment at salaries of \$720 to \$900 and also to provide for a considerable number of temporary examiners required during the summer months at salaries from \$60 to \$100 a month. Candidates must be graduates of a high school or have an equivalent education according to the standard of the department and must have had at least three years' experience in teaching. Subjects of examination and relative weights: Written examination in groups of subjects selected by applicant from list given below, 8; education and experience, 2. The scope of examination in each group of subjects is indicated by the Regent's syllabus. Candidates may take examination in one or more groups specified in the same application, but may not take more than one group on the same date.

Group 1. English language and literature.

2. Modern languages (French, German, Spanish). Candidates are required to qualify in two of these languages to be specified in the application.
3. Ancient languages (Latin and Greek). Latin will be given a weight of 75 per cent. and Greek a weight of 25 per cent. in the rating.
4. Mathematics (arithmetic, business arithmetic, algebra, plane and solid geometry, plane and spherical trigonometry).
5. Science (physics, chemistry, physical geography, botany, physiology and hygiene). Candidates are required to qualify in three sciences to be named in the application.
6. History (United States, New York State, English, modern European and ancient). Candidates are required to select and answer a certain number of questions from a paper covering all these topics.
7. Civics and economics.

8. Pedagogy (school law, methods, school economy, history of education, art of questioning).

EXAMINER, STATE CIVIL SERVICE COMMISSION.—\$1,000. Open to men and women. The principal work is the preparation of questions and rating of papers in civil service examinations. Considerable clerical work is also required. Candidates must be graduates of a high school or have an equivalent education according to the standard of the Regents. Additional credit will be given for college, university, technical or professional education or for experience which will be useful in the work of the position. Subjects of examination and relative weights: Rapid computation (test for speed and accuracy in addition, subtraction, multiplication, division, fractions, decimals and simple percentage), 2; United States history and civics, 2; arithmetic and elementary algebra, including the metric system, mensuration and the use of logarithms, 3; essay (choice of two assigned topics relating to the public service and the merit system), 3; preparation of questions and rating of answers (principles and their application to actual cases), 3; education, 4; experience, 3.

LECTURER AND INSPECTOR, EDUCATION DEPARTMENT.—\$2,500. The duties are to act as lecturer and instructor for the education department at farmers' institutes and other duties connected with the inspection and examination work of the department as assigned. The positions require men of sound scholarship, college graduates preferred with practical experience in teaching, familiarity with courses of study and details of management of both elementary and secondary schools, ability to inspect and judge accurately the work in all grades of schools, and adaptability and experience to speak in public and represent the department at the institutes. Subjects of examination and relative weights: Methods and principles of education, school economy (including school hygiene, school management, buildings, equipment, etc.), school law, history of education, special duties of the position, 5; experience, education and personal qualifications, 5.

MESSENGER.—Minimum age, 18 years. Salaries usually from \$500 to \$1,000. Subjects of examination and relative weights: Spelling, 1; writing from memory the substance of verbal orders, 2; copying from plain copy, 1; arithmetic (fundamental operations, fractions and United States money), 1; questions on the duties of the position, 2; experience, education and personal qualifications, 3.

OFFICER, (MALE) STATE CHARITABLE INSTITUTIONS.—Minimum age 21 years. Usual salary, \$540. Subjects of examination and relative weights: Spelling, 1; writing from memory the substance of verbal orders, 2; copying from plain copy, 1; arithmetic (fundamental rules, fractions and United States money), 1; questions on the duties of the position, 3; experience and personal qualifications, 2. Time allowed, six hours.

OFFICER, (WOMAN) STATE INSTITUTIONS.—\$30 a month and maintenance. This examination covers positions for women as assistant matrons, housekeepers and similar positions in institutions for women and children. Higher positions in these institutions are filled by promotion of women officers. Subjects of examination and relative weights: Spelling, 1; writing from memory the substance of verbal orders, 2; copying from plain copy, 1; arithmetic (fundamental operations, fractions and United States money), 1; questions on the duties of the position, 3; experience, education and personal qualifications, 2.

PAGE.—Open only to boys from 14 to 18 years of age. Salaries in this position are limited to \$360 at original appointment and \$480 as a maximum. Promotion to higher salaries is allowed only upon passing an examination equivalent to that for messenger or junior clerk. Candidates must submit with the application a certificate showing that they have completed the course in a school of grammar grade. Such certificates will be returned after being recorded. Subjects of examination and relative weights: Spelling, 2; writing from memory the substance of verbal orders, 2; letter writing, 1; penmanship, 2; arithmetic, 3.

STENOGRAPHER.—The stenographer examination is held in four grades, as indicated below. Candidates may compete for any or all grades on the same application. Eligibles will be certified strictly according to the grade of examination taken, except that in case the eligible list for one grade is exhausted, names may be certified from the list for the next lower grade.

First, second and third grades, for positions at salaries of not more than \$600, including some office positions and most of the positions in hospitals and institutions. Dictation at the rate of 80 words a minute.

Fourth and fifth grades, for positions at salaries over \$600 to \$900, including most of the positions in State offices and departments. Dictation at the rate of 100 words per minute.

Sixth grade, for positions at salaries over \$900 to \$1,200. Dictation at the rate of 125 words per minute.

Seventh grade, for positions at salaries exceeding \$1,200. Dictation at the rate of 150 words per minute.

Subjects of examination and relative weights for all grades: Spelling, 2; accuracy and speed in taking in shorthand and transcribing with typewriter dictated matter about 500 words in length, 10; copying and spacing with typewriter, 3; letter-writing, 3; penmanship, 1; arithmetic (fundamental operations, fractions, percentage and interest), 1.

TEACHER, STATE INSTITUTIONS.—\$360 to \$720 and maintenance. Open to both sexes. Candidates must hold an academic certificate to teach in the public schools of the State or equivalent. These positions are exclusively in State institutions of a charitable or correctionary nature, such as the State Industrial School, Houses of Refuge, State School for the Blind, etc., and the incumbents of the different positions are often required to have a knowledge of a special subject, such as vocal and instrumental music, kindergarten work, typewriting, gymnastics, and physical culture, etc. Subjects of examination and relative weights: Spelling, 2; methods and school economy, 2; geography, 2; English grammar, 2; arithmetic, 2.

II. IN UNITED STATES.

BOOKKEEPER, DEPARTMENTAL SERVICE.—Age limit, 20 years or over; application form, 304; time allowed, seven hours; this examination may be taken only in the fall on the date and at the places marked D in the schedule. Entrance salary, from \$720 to \$1,000.

Subjects.	Weights.
1. Spelling, first grade.....	7.5
2. Practice of bookkeeping.....	50
3. Arithmetic, first grade.....	12.5
4. Letter-writing, first grade.....	12.5
5. Penmanship.....	7.5
6. Copying from plain copy, first grade.....	5
7. Copying from rough draft, first grade.....	5

CLERK, DEPARTMENTAL SERVICE.—Age limit, 20 years or over; application form, 304; time allowed, five hours. This examination may be taken in the spring only, on the dates and at the places marked A, B, or C in the schedule. Entrance salary, from \$600 to \$900.

Subjects.	Weights.
1. Spelling, first grade.....	15
2. Arithmetic, first grade.....	25
3. Letter-writing, first grade.....	25
4. Penmanship.....	15
5. Copying from plain copy, first grade.....	10
6. Copying from rough draft, first grade.....	10

MESSENGER, DEPARTMENTAL SERVICE.—Age limit, 18 years or over; application form, 304; time allowed, three hours. This examination may be taken in the fall only, at the places marked A, B, and C in the schedule. Entrance salary, \$360 to \$720.

Subjects.	Weights.
1. Spelling, third grade.....	20
2. Arithmetic, third grade.....	20
3. Letter-writing, third grade.....	20
4. Penmanship.....	20
5. Copying from plain copy, third grade.....	20

STENOGRAPHER, DEPARTMENTAL SERVICE.—Age limit, 20 years or over; application form, 304; time allowed, five and one-half hours, of which one and one-half hours are allowed for transcribing the stenographic notes. This examination may be taken on the dates and at the places marked A or C in the schedule. Entrance salary, from \$600 to \$1,000.

Subjects.	Weights.
1. Arithmetic, first grade.....	5
2. Penmanship	5
3. Letter-writing, first grade.....	5
4. Copying from rough draft, first grade.....	10
5. Stenography	75

The practical test in stenography will consist of two exercises, a letter and a speech, each containing 260 words. The dictations are given to all the competitors together. A preliminary test is given at a rate of 80 words per minute, in order to familiarize the competitors with the examiner's manner of dictation. This preliminary test will not be considered a part of the examination, and should not be transcribed. The regular exercises (a letter and a speech are considered as one exercise) will then be dictated at different rates of speed as follows: 80 words, 100 words, 120 words, and 140 words per minute. A rating of 70 per cent in speed will be given when the dictation is at the rate of 80 words per minute, 80 per cent for 100 words, 90 per cent for 120 words, and 100 per cent for 140 or more words per minute. The competitors will be permitted to enter the regular tests at as many different rates of speed as they may desire, but they will be required at the conclusion of the tests to select the one which they wish to transcribe and be considered in the rating. Examiners will give competitors sufficient time to make the selections. The test which they select will be the only one which they will be permitted to transcribe, and the notes of all other tests will be taken up at once by the examiner. These notes will be forwarded to the Commission, together with the other papers of the stenography examination, but will not be considered in the rating. The notes of the exercise transcribed should be

attached to sheet 4 when the competitor surrenders that sheet. The notes may be transcribed either in longhand or with the typewriter. An applicant for this examination who desires his name entered also on the departmental clerk register of eligibles should apply for the clerk-stenographer examination, and is required to take the first-grade spelling and first-grade copying from plain copy in addition to the above-named subjects. For these subjects forty-five minutes' additional time will be allowed. Only one application is required for the combined examination.

Specimen Examinations.

I. NEW YORK STATE CIVIL SERVICE.

FOR CLERK AND JUNIOR CLERK.

1 *Spelling*.—The examiner will first pronounce the word, then define it or exemplify it in a sentence, then pronounce it again, after which the competitor is required to write the word on the spelling blank. The competitor should not write the definition, nor should he begin words with capitals unless they are proper names.

abolish	warrant	economy
balloon	delegate	homage
heinous	coercion	nicety
piracy	effigy	efficient
caucus	citation	almanac
tenure	specimen	changing
civilian	erroneous	illegible
stupefy	revenue	criticise
libelous	judgment	elementary
discrepancy	evasion	delineate
durable	serviceable	veteran
callous	hideous	vacillating
fascinating	emotion	novelist
secession	medicate	emigrate
apparel	variance	baptism
annuity	rarity	deprecate
circuit	forfeit	

2 *Arithmetic*.—Write only the answers on this sheet in the spaces provided. Perform necessary computations, if any, on scratch paper. No credit will be given for a wrong answer. The examiner, not the competitor, will enter the time of commencing and finishing the test.

1 Add the following numbers across, placing the sums in the spaces provided, and find the grand total:

\$36,968	\$7,634	\$14,262	\$5,254
22,635	28,329	37,257	36,221
9,564	82,378	6,295	98,737

49,877	69,764	34,472	15,411.5
46,367	8,927	4,639	5,943.3

Grand total \$.....

2 Find the gain on each of the following items and the total gain:

Selling price	Cost	Gain
\$40,000.00	\$37,624.37	\$.....
9,437.83	5,819.24	.....
4,341.85	2,838.96	.....
57,640.33	48,924.29	.....
89,754.00	68,947.25	.....

Total \$.....

3 Perform the following indicated operations:

$$425 \div \frac{5}{8} = \dots\dots\dots$$

$$234 \div 33\frac{1}{3}\% = \dots\dots\dots$$

$$25\% \times \frac{2}{3} = \dots\dots\dots$$

$$9\frac{1}{8} - 4\frac{2}{10} = \dots\dots\dots$$

$$\frac{1}{3} + \frac{1}{6} + \frac{1}{9} = \dots\dots\dots$$

4 Find the selling price of each of the following:

Cost		Selling price
\$.16	37½% gained	\$.....
6.00	20% lost	.....
56.00	25% gained	.....
4.50	16⅔% lost	.....
828.00	¼% gained	.....

5 Perform the following indicated operations:

$$9 \times 12 \times 14 \div 42 = \dots\dots\dots$$

$$95 \times 8 \times 3 \div 19 = \dots\dots\dots$$

$$52 \times 8 \times 7 \div 91 = \dots\dots\dots$$

$$20 \times 21 \times 22 \div 154 = \dots\dots\dots$$

$$(48 \times 36 \times 24) \div (16 \times 12) = \dots\dots\dots$$

6 Find the value of each of the following:

$$+ \frac{5}{6} - \frac{1}{6} \times 12\frac{1}{2} = \dots\dots\dots$$

$$\frac{3}{4} \times 12\frac{1}{2} = \dots\dots\dots$$

$$2\frac{15}{16} \times \frac{15}{16} \times \frac{14}{65} = \dots\dots\dots$$

$$\dots\dots\dots$$

7 Find in each of the following the number of hours and minutes from time commenced to time finished:

Time commenced	Time finished	Hours	Minutes
9:50 a. m.	4:13 p. m.	6	23
9:16 "	3:55 "	6	39
9:45 "	12:16 "	2	31
10:15 "	1:00 "	2	45
9:14 "	10:02 "		48

8 Reduce each of the following groups to equivalent fractions having the least common denominator:

$$\begin{array}{l} \frac{9}{24} \frac{12}{18} \frac{7}{12} \frac{11}{36} = \frac{11}{72} \frac{11}{72} \frac{11}{72} \frac{11}{72} \\ \frac{4}{15} \frac{5}{21} \frac{4}{27} \frac{2}{63} = \frac{8}{315} \frac{8}{315} \frac{8}{315} \frac{8}{315} \\ \frac{3}{5} \frac{4}{7} \frac{11}{14} \frac{9}{10} = \frac{36}{70} \frac{36}{70} \frac{36}{70} \frac{36}{70} \\ \frac{5}{12} \frac{8}{21} \frac{11}{28} \frac{13}{42} = \frac{55}{84} \frac{55}{84} \frac{55}{84} \frac{55}{84} \end{array}$$

9 Divide the numbers in column 1 by the numbers in column 2, and express your answer as per cent correct to two figures only:

Column 1	Column 2	Per cent.
245,326	981,804	.....
5,253	30,900	.....
12,596	59,923	.....
257,515	476,878	.....
18,487	55,460	.....

10 Multiply each of the following percentages by its relative weight, and find the general average by dividing the sum of the products by the sum of the relative weights:

Percentages	Relative weights	Products
81.33½	12	.....
97.51	8	.....
65	5	.....
69.16	7	.....
97.4	3	.....
	—

General average		.....

3 Letter writing.—Write a letter of not less than 150 words to the State Civil Service Commission, Albany, New York, giving your views of: 1 The relative merit of public and private schools; or 2 The advan

tages or disadvantages to the United States of freedom of immigration. Sign your examination number, not your name. You are at liberty to make preliminary drafts on other paper before putting the final work on this sheet.

In marking the letter, its errors in form and address, in spelling, capitalization, punctuation, syntax and style and its adherence to and treatment of the subject given will be considered, and its value in the judgment of the examiners marked on a scale of 100.

In determining the mark for letter writing, the examiner will be guided generally by the following scheme: Excellent, 100 to 90; good, 90 to 80; fair, 80 to 70; ordinary, 70 to 60; poor, 60 to 50; very poor, 50 to 25; practically worthless, 25 to 0.

4 Copying from plain copy and rough draft.—

1 Copy precisely the following:

New York State Soldiers' and Sailors' Home, Bath

The Governor (by and with the consent of the Senate) appoints the trustees of the New York State Soldiers' and Sailors' Home, located at Bath, in the county of Steuben. They hold office for the term of three years and serve without compensation. The Board of Trustees is composed of nine members, exclusive of the Governor and Attorney-General, who are ex-officio members.

Trustees	Residences	Appointed
George W. Dunn.	Binghamton.	April 8, 1903
Benton McConnell.	Hornell.	July 1, 1903
Clinton D. MacDougall.	Auburn.	January 15, 1904
Charles A. Orr.	Holland.	January 15, 1904
Joseph A. Goulden.	New York.	May 6, 1904

The object and purpose of the Home is to provide for the care, maintenance and relief of soldiers and sailors from the state of New York who served in the army or navy during the war of the Rebellion, and received an honorable discharge therefrom, who from any cause stand in need of the care and benefits of a soldiers' home.

2-3 Make on the accompanying blank sheet a smooth copy of the manuscript letter given below, correcting all

errors in spelling and syntax, and punctuating and capitalizing properly. Write in full all abbreviated words, except standard abbreviations in the date and address. No changes are permitted, except those necessary to correct errors in syntax, spelling, punctuation and capitalization, and to write in full abbreviated words. Do not sign your name.

PO dept. Washington.
DC Jan'y 16 1893.

Hon^{ble} Jas Smith

Dear Sir I am in answer to your

inquiry of the 30th I have the honor to state that we do not grant leaves of absence when they are injured in Railway accidents while on duty which incapacitates them for service permanently or temporarily these leaves cover a part of the year unless they recover before that time but if the disability extends beyond that period the dept is obliged to retire the clerk from the Service This regulation is not a good one but it does not meet the emergency fully and fairly It is respectfully recommended that provisions for the special employment of clerks be made,

Very Respectfully.

John Hamanster.

M. Gail.

Compiled under existing laws

To Railway postal clerks who receive injuries

who has been permanently disabled - by accidents

answer to inquiry

FOR BOOKKEEPER.

- 1 Spelling.—Similar to that for clerk.
- 2 Penmanship.—Marked from written papers.
- 3 Rapid computation.—Similar to that for clerk.

4 Bookkeeping and commercial arithmetic.—1 What, in your opinion, are the most important books used in double entry bookkeeping? State briefly the use of each one named. In case of litigation, which book or books must be submitted to establish the facts of a transaction? 2 Explain the responsibility taken by a person when he indorses a check or note. What form of indorsement should be used in transferring a draft to be sent by mail? 3 What is the purpose of taking a trial balance? Name three common errors which will throw books out of balance? If a trial balance does not balance, what steps would you take to locate the error? 4 In closing a ledger in double entry bookkeeping, what accounts are required to be closed? How is an account that shows loss or gain closed, if it has no inventory? How, if it has a resource inventory? How, if it has a liability inventory? 5 A note of \$1,050, dated Jan. 4, 1902, to run two months, is discounted at a bank on Jan. 23, 1902, at 6% per annum. Find the proceeds. 6 A lot of woolen cloth, weighing 1,200 pounds, is invoiced in Liverpool as 1,575 yards at 9s. 6d. per yard. Find the amount of duty to be paid at New York at 50c. per pound and 25% ad valorem. 7 My broker buys for me 200 shares C. B. & Q. stock at 135¾. brokerage ¼%, and I deposit a margin of \$3,000. After 30 days, I instruct him to sell at 135. Allowing interest at 6%, and ¼% for selling, how much of the \$3,000 should he return to me? 8 A and B are partners. On Jan. 1, 1901, A invested \$6,000 and B \$7,500. A has withdrawn \$1,050 during the year, and B \$1,850. According to the agreement, A should be credited at the end of the year with \$1,200 for services, and B with \$1,500. The remainder of the net gain, or the net loss, should be divided equally. On Jan. 1, 1902, there are the following resources and liabilities: Merchandise on hand worth \$10,590.75, cash in bank \$1,140.19, open book accounts due the firm, considered good (not including the partners' accounts) \$7,900.45, accounts payable \$4,901.66, and office furniture worth \$1,250. Find the present worth of each partner on Jan. 1, 1902. 9-13

Using paper to represent a journal, a sales book, and a cash book, make entries for the following transactions in double entry form. Jan. 3, 1902. Bought of G. W. Gould & Co., Boston, an invoice of goods amounting to \$1,800.45 at 60 days; 5%, 10 days. Jan. 4. Sold H. R. Holding, of Dayton, Ohio, merchandise worth \$925.10. Received cash \$500, and drew on him at sight for the balance. Left the draft at the bank for collection. Jan. 6. Accepted G. W. Gould & Co.'s draft at 10 days, for invoice received Jan. 3, less 5%. Jan. 8. Sold J. C. Adding a bill of goods amounting to \$410.25 at 30 days; 2%, 5 days. Jan. 11. Received of J. C. Adding his note at 30 days with interest for invoice of Jan. 8, less 2%. Jan. 13. Discounted at the bank the note of J. C. Adding, and received credit for its face. Also discounted my note for \$1,000, indorsed by Burke & Haner, receiving credit for its face, less discount at 6% for 30 days. My acceptance, dated Jan. 3, favor of G. W. Gould & Co., and due to-day, is paid by check. 14-16 Following is given the condition of each account in John W. Doe's ledger, also, the inventories taken Jan. 1, 1902. Make a trial balance, a statement of the losses and gains for the year, and a statement of the resources and liabilities on Jan. 1, 1902:

Investment account, Cr.....	\$30,910 67
John W. Doe (private account), Dr.....	2,040 00
Merchandise (inventory Jan. 1, 1901).....	22,201 29
Purchases (Jan. 1, 1901, to Jan. 1, 1902) ..	27,499 26
Sales (Jan. 1, 1901, to Jan. 1, 1902).....	31,400 60
Notes receivable	297 40
Accounts receivable (considered good).....	6,710 30
Accounts receivable (considered worthless) ..	320 00
Accounts payable	8,646 45
Bills payable	2,400 75
Real estate (cost).....	7,500 00
Fixtures (cost).....	1,210 00
Traveling expenses	662 50
Salaries of employees.....	1,920 00
Advertising	525 73
General expenses	1,524 27
Cash on hand.....	947 72

Inventory taken Jan. 1, 1902.

Mdse. on hand.....	\$26,660 27
Real estate valued at.....	7,500 00
Fixtures	1,075 00
Due J. M. Hart (bill for blank books and stationery)	67 30

6 *Experience and education*.—Marked from candidate's sworn statement and from the replies to letters of inquiry sent by the Commission.

FOR PAGE.

1 *Spelling*.—Fifty easy words in common use. The examiner will first pronounce the word, then define it or exemplify it in a sentence, then pronounce it again, after which the competitor is required to write the word on the spelling blank. The competitor should not write the definition, nor should he begin words with capitals unless they are proper names.

portion	seller	system
cell	arrest	useful
criminal	duties	flannel
warrant	threat	legible
ceiling	grease	usually
ninety	visit	business
careful	answer	cashier
officer	cellar	exist
imprison	ginger	carrying
sentence	bargain	sheet
carpenter	seizing	easily
negro	loser	patience
sugar	zinc	diamond
pledge	salary	newspaper
guest	equal	repair
figure	fitness	eager
breadth	usage	

2 *Letter writing*.—Write a short letter applying for the position mentioned in the following advertisement. Sign your examination number, not your name.

WANTED.—An office boy, to commence at \$16 per month. Address in your own handwriting, stating age, education, previous experience and references as to character, State Civil Service Commission, Albany, N. Y.

3 *Penmanship*.—Marked from exercise in letter writing.

4 *Arithmetic*.—In solving problems the entire work of solution must be given. 1 Add the following amounts both ways, in columns and across the page, and prove your work by adding the results: (Six columns of five numbers each consisting of four figures). 2 A train goes from Jersey City to Washington, a distance 228 miles in 4 hours 12 minutes. How many miles an hour does it travel? 3 Find the total cost of mailing the following: 1,500 printed circulars in separate envelopes each weighing one ounce, 6 packages of the same circulars each weighing 10 ounces, 25 letters each weighing less than one ounce, 3 letters weighing respectively $2\frac{1}{2}$ ounces, 3 ounces and $1\frac{1}{4}$ ounces, 4 newspapers wrapped separately weighing 3 ounces each and 2 magazines in one package weighing 20 ounces; rates of postage as follows: Letters 2c. an ounce or fraction thereof. Newspapers and magazines 1c. for each 4 ounces or fraction thereof. Circulars 1c. for each 2 ounces or fraction thereof. 4 A grocer bought three invoices of flour as follows: 65 barrels at \$4.74 a barrel, 124 barrels at \$5.25 a barrel, and 111 barrels at \$5.20 a barrel. At what price must he sell to gain an average of 75c. per barrel on the whole? 5 If a young man earns \$60 a month and spends $\frac{1}{3}$ of this amount for his board, $\frac{1}{5}$ for clothes, and $\frac{3}{8}$ for all other expenses, how much does he save in a year? 6 How many yards of carpet $\frac{3}{4}$ of a yard wide will it take to cover a floor 24 feet wide and 32 feet long?

5 *Verbal orders*.—Directions: One of the examiners will dictate three orders of which the candidate is required to write down the substance on this sheet. The order will be given once only and the mark will be given for substance, not for the exact form of the order. Do not write while the examiner is dictating, but listen attentively. Time will be given for writing each order before the next is dictated. 1 Take your place at the east door from one o'clock until nine o'clock P. M. Admit no one except employees who are known to you and those presenting orders from the office. 2 A man has fallen on the front steps and cut his head badly. Go and tell Dr. Peters to bring a stretcher and

remove him to the hospital. 3. Tell the janitor to put in new window panes in place of the broken ones in the main hall, and to repair the lock on the door of the superintendent's office this afternoon.

FOR STENOGRAPHY.

1 *Spelling*.—Similar to that for clerk.

2 *Stenography*.—Sample passage for dictation.—

At the end of the fiscal year, the books and accounts of this department were compared with the similar accounts kept by the State comptroller. The balances in the several accounts were found to agree, both as to the general appropriation account and the rebate account. The department's books were also checked with books of the comptroller's department, for the purpose of determining the amounts paid to the state treasurer by county treasurers and special deputy commissioners, on account of excise collections. The general observance and enforcement of the law has been quite as good as expected and a material improvement on the preceding year. The indifference of public officials charged with its execution has largely disappeared. The higher courts have sustained the law and given strength to its provisions by favorable decisions in most of the cases brought before them for adjudication. The increased number of legal decisions upon questions arising under the liquor tax law has helped very much in settling matters heretofore uncertain and in dispute, and has been of great value to the department, as well as to those in the trade and the people generally. There has been more discussion of the liquor tax law and more interest taken in its workings and results during the past twelve months than any year since its passage. This interest has not been confined to any particular class, but has been general. There has been a marked increase in the demand for statistics relative to the law and its operation, and the limited edition of three thousand annual reports of this department, published by the last legislature, was almost wholly exhausted within

sixty days from its publication. An urgent increased demand for copies of the law and statistics relative to and bearing upon the liquor traffic under the present and previous laws, was created when one of the great political parties promised in its platform, if sustained by the people, to promptly repeal the act. This unexpected partisan attack upon the law aroused a great deal of interest throughout the state, and has caused much earnest inquiry and discussion as to its merits and demerits. The discussion has been carried on by the press, from the platform and pulpit, as well as among the people generally; in every city, hamlet and town in the state, and from it has risen an unexpected and phenomenal demand for copies of the law, official reports, figures, facts and general statistics bearing upon the excise question. This material the department has supplied as best it could. The agitation and thorough discussion of the subject, so materially affecting the welfare and interest of the inhabitants of the state, was a thing much needed, and the comments and arguments thus provoked and carried on have done much good. They have familiarized the people with what has been done, and demonstrated what can and ought to be expected and accomplished under the law when fully understood and fairly administered and observed. Formerly most citizens had taken very little pains to inform themselves, and consequently had but little knowledge of the law or the details of its operation.

3 *Copying and spacing*.—This exercise consists in making an exact copy of a fac-simile of typewritten matter and is rated for speed and accuracy. No specimen questions can be furnished.

4 *Letter writing*.—Write with the typewriter a letter of not less than 125 words using *one* of the following topics: 1 Recommending a school of stenography to a friend, or 2 Answering a request for your opinion of stenography as an occupation. Supply full addresses and necessary details. Sign your examination number, not your name. You are at liberty to make preliminary drafts on other paper before putting the final work on this sheet. In marking the letter, form and address, paragraphing, spelling, punctuating, use of capitals,

syntax, style and treatment of subject will be considered.

5 *Penmanship*.—An exercise in copying from plain copy will be given, which will be marked only for penmanship.

6 *Arithmetic*.—N. B.: In solving problems the entire process and computation must be given. 1 Write in figures, as one number, fifteen million two thousand fifty-five. 2 Write, in the Roman notation, 65, 90, 145, 508. 3 Add together one-third, one-fourth and one-seventh. 4 Multiply 9875 by 307 and divide by 79. 5 Which is greater (and how much) one-seventh or three-elevenths? 6 Find the cost of the following: 348 eggs at 14 cents per dozen; 643 lbs. of sugar at $6\frac{1}{2}$ cents per lb. and 7750 lbs. of coal at \$5.87 per ton. 7 Find the interest on \$725 for one year and ten months at seven per cent. 8 An agent receives \$1,092.42 with which to buy oats at 42 cents per bushel, after deducting his commission of 2 per cent on sum expended; how many bushels can he buy?

II. UNITED STATES CIVIL SERVICE.

The general scholastic subjects of many examinations, such as spelling, arithmetic, letter-writing, and copying from plain copy, are of three grades or degrees of difficulty, known as first, second, and third grades—the first grade being the most difficult and the third grade the least difficult. These subjects are designated under the different examinations as “grade subjects.” In the descriptions of examinations comprising any of these subjects reference will be made to the particular grade of the subject comprised. In addition to these subjects, the subject of geography is included in the first and second grades and the subject of copying from rough draft in the first grade.

The different subjects in each examination are given relative weights according to their importance. These weights represent the value of each subject in the whole examination. The method of obtaining the general average of an examination is as follows: Multiply the average obtained in each subject by the relative

weight of that subject, add the products, and divide the sum of the products by the sum of the relative weights. The quotient thus obtained will be the general average for that examination.

First Grade Subjects.

1 *Spelling*: Twenty words slightly above average difficulty. 2 *Arithmetic*: Fundamental rules, fractions, percentage, interest, discount, and analysis. 3 *Letter writing*: Test in the use of the English language for business correspondence. 4 *Penmanship*: Marked on legibility, neatness, and general appearance. 5 *Copying from plain copy*: An exact written copy of a few printed lines. 6 *Copying from rough draft*: Draft of manuscript with interlineations, erasures, misspelled words, errors in syntax, etc., of which a smooth corrected copy is to be made. 7 *Geography of the United States and foreign countries*.

The following questions and tests indicate the general character of these subjects:

SPELLING.

Spelling is dictated by the examiner. The words are written by the competitor in the blank spaces indicated on the first sheet of the examination. The examiner pronounces each word and gives its definition as printed below. The competitor is required to write only the word and not its definition.

Ginger: The root of a medicinal plant. *Certificate*: A written testimony; as, a certificate of stock. *Promissory*: Containing a promise; as, a promissory note. *Seizing*: Taking suddenly. *Zinc*: A whitish metal. *Adjacent*: Lying near or bordering on. *Properly*: In a proper or right manner. *Schenectady*: A city of the United States. *Opportunity*: A fit or convenient time. *Insertion*: The act of placing in; as, the insertion of an advertisement. *Usage*: Custom in using; as, commercial usage. *Facilitate*: To make easy; as, to facilitate business. *Legible*: Capable of being read; as, a legible signature. *California*: One of the United States. *Flannel*: A soft woolen cloth of loose texture. *Business*:

Occupation or trade. *Handkerchief*: A piece of cloth for wiping the face or nose. *Strychnine*: A powerful poison. *Concede*: To give up; to yield; as, to concede a point. *Souvenir*: A token of remembrance; a keepsake.

ARITHMETIC.

1 This question comprises a test in adding numbers crosswise and lengthwise. There are usually three columns of about twelve numbers each to be added. 2 Divide $47\frac{3}{25}$ by $7\frac{3}{5}$, multiply the quotient by $3\frac{4}{5}$, and to the product add 0.0907 of 214.6. A grocer sold goods to a customer, amounting to \$352, by weights averaging $15\frac{1}{4}$ ounces to the pound. He afterwards sold to the same customer goods amounting to \$320, by weights averaging $16\frac{1}{2}$ ounce sto the pound. How much did the grocer make or lose by the false weights? 4 The appropriation for the Civil Service Commission for the fiscal year ended June 30, 1897, was \$98,340. During that year 50,000 persons were examined. If 34 per cent of this number failed to pass, and $17\frac{1}{2}$ per cent of those who passed were appointed, what was the average cost to the Government of each appointment? 5 A sum of money placed at simple interest amounted in 1 year and 6 months to \$2,687.50. If it had remained at the same rate of interest for six months longer, it would have amounted to \$2,750. What was the rate of interest per annum?

COPYING FROM ROUGH DRAFT.

N. B.—Spelling, use of capitals, and all omissions and mistakes will be taken into consideration in marking this subject.

Directions to the competitor.—Write on the accompanying blank sheet a smooth copy of the manuscript on this sheet. Make such changes only as are necessary to correct errors in syntax, orthography, punctuation, and capitalization, and to write in full abbreviated words. Paraphrasing and the insertion or omission of words which does not improve the text are not permitted.

PENMANSHIP.

The mark on penmanship will be determined by legibility, rapidity, neatness, and general appearance, and by correctness and uniformity in the formation of words, letters, and punctuation marks in the exercise of the fifth subject—copying from plain copy. No particular style of penmanship is preferred.

COPYING FROM PLAIN COPY.

N. B.—Paragraph, spell, capitalize, and punctuate precisely as in the copy. All omissions and mistakes will be considered in marking this subject.

Make an exact written copy of the following:

The civil service act has also limited the power of removal by providing that no person serving in any department or office shall be removed because of his refusal (1) to contribute for a political purpose, or to render political service; or (2) to permit the appointing officer, or any other person in the service to coerce his political action. The object of Congress in thus limiting the power of appointment and removal was manifestly to divorce the subordinate offices of the Government from politics and elections. The law provides that open, competitive examinations shall be held by the commission; that these examinations shall be practical in their character, and, so far as may be, shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of the places to which they seek appointment.

GEOGRAPHY.

1 Name States as follows: Two that border on the Columbia River; two that border on both the Missouri and Mississippi rivers; two that border on both Virginia and the Ohio river; two that border on New Jersey; two that border on the Savannah River. 2 In what State is each of the following-named: Penobscot Bay, Corpus Christi Bay, Puget Sound, Pearl River, Oneida Lake. 3 Name the largest city in each

of the following-named States, and name the river or body of water on which each city required is situated: Connecticut, Mississippi, Nebraska, Minnesota, Ohio. 4 In what State is each of the following-named prominent cities located: Racine, Bangor, Allegheny, Charlotte, Cairo, Los Angeles, Shreveport, Fargo, Evansville, Ogdensburg. 5 In what foreign country, colony, or possession is each of the following-named prominent cities: Bremen, Buenos Ayres, Yokohama, Cape Town, Havre, Melbourne, Adrianople, Ottawa, Teheran, Panama.

Second Grade Subjects.

1 *Spelling*: Twenty words of average difficulty in common use. 2 *Arithmetic*: Embraces addition, subtraction, multiplication, and division of whole numbers, and common and decimal fractions. 3 *Letter writing*: Test in the use of the English language for business correspondence. 4 *Penmanship*: Marked on legibility, neatness, and general appearance. 5 *Copying from plain copy*: An exact copy of a few printed lines, in competitor's handwriting. 6 *Geography of the United States*.

The following questions and tests indicate the general character of these subjects:

SPELLING.

Spelling is dictated by the examiner. The words are written by the competitor in the blank spaces indicated on the first sheet of the examination. The examiner pronounces each word and gives its definition. The competitor is required to write only the word and not its definition.

Manual: Done with the hands; as, manual labor. *Newspaper*: A printed paper that gives the news. *Exceed*: To surpass or go beyond; as, to exceed one's authority. *Eighth*: Next in order after seventh. *Wisconsin*: One of the United States. *Vehicle*: That in which anything may be carried. *Peaceable*: Gentle or peaceful. *Eager*: Keenly desirous; as, eager to go.

Cellar: A storeroom under a house. *Delicate*: Very nice; as, a delicate flower. *Assign*: To set apart; as, to assign to duty. *Conceal*: To hide or secrete; as, to conceal valuables. *Minute*: The sixtieth part of an hour. *Benefit*: Advantage or profit. *Awning*: A cover spread for shade. *Forward*: To send toward a destination; as, to forward mail. *Withhold*: To hold back; as, to withhold one's pay. *Diligent*: Busy or active; as, a diligent clerk. *Offered*: Presented for acceptance or rejection. *Station*: A stopping place; as, a railway station.

ARITHMETIC.

1 Add the following. and from the sum subtract 32,885,696 (here will be given a short column of figures). 2 Multiply $7\frac{2}{25}$ by 36.8, and divide the product by 1.92. Solve by decimals. 3 A carrier can assort 43 letters or 37 papers in a minute. At this rate, how many hours will it take him to assort 3,655 letters and 185 pounds of papers, averaging 7 papers to the pound? 4 A lot which was 53 feet wide and 150 feet long sold for \$8,347.50, which was one-fourth more than it cost. What was the cost per square foot? 5 In a certain mail there are 294 pounds 14 ounces of newspapers weighing at the rate of 3 papers to every 7 ounces. How many papers are there in the mail? 16 ounces = 1 pound.

LETTER WRITING

The competitor is permitted to write on either one of two subjects given. The following subject has been used:

Write a letter of not less than 125 words giving your views as to the advantages derived from free public libraries in the principal cities of your State. This exercise is designed chiefly to test the competitor's skill in simple English composition. In marking the letter, its errors in form and address, in spelling, capitalization, punctuation, syntax, and style, and its adherence to the subject will be considered.

PENMANSHIP.

The mark on penmanship will be determined by legibility, rapidity, neatness, and general appearance, and by correctness and uniformity in the formation of words, letters, and punctuation marks in the exercise of the fifth subject—copying from plain copy. No particular style of penmanship is preferred.

COPYING FROM PLAIN COPY.

N. B.—Paragraph, spell, capitalize, and punctuate precisely as in the copy. All omissions and mistakes will be taken into consideration in marking this subject.

Make an exact written copy of the following:

No recommendation of an applicant, competitor, or eligible, involving any disclosure of his political or religious opinions or affiliation, shall be received, filed, or considered, by the commission, by any board of examiners, or by any nominating or appointing officer. In making removals or reductions, or in imposing punishment for delinquency or misconduct, penalties like in character shall be imposed for like offenses, and action thereupon shall be taken irrespective of the political or religious opinions or affiliations of the offenders. A person holding a position on the date said position is classified under the civil service act shall be entitled to all the rights and benefits possessed by persons of the same class or grade appointed upon examination under the provisions of said act.

GEOGRAPHY OF THE UNITED STATES.

N. B.—Competitors are cautioned not to exceed the requirements of the questions in their answers, as no credit will be given for additional information.

1 Name States as follows: One which borders Alabama on the north; one which borders New Hampshire on the east; one which borders New Mexico on the north; one which borders Indiana on the west; one which borders Pennsylvania on the north. 2 Name the largest city in Rhode Island; the largest city in Oregon;

the capital of Louisiana; the capital of Nebraska; the capital of West Virginia. 3 Name a river and another large body of water which border on each of the following-named States: Wisconsin, Maryland, Washington, Vermont, Texas. 4 Name the river or body of water on which each of the following-named important cities is situated: Louisville, Buffalo, Duluth, Hartford, Vicksburg. 5 In what State or Territory is each of the following-named prominent cities located: Worcester, Phoenix, Key West, Sioux Falls, Camden, Asheville, Utica, Saginaw, Rutland, Dubuque.

Third Grade Subjects.

1 *Spelling*: Twenty simple words in ordinary use. 2 *Arithmetic*: Embraces addition, subtraction, multiplication, and division of whole numbers and of United States money. 3 *Letter writing*: Test in the use of the English language for business correspondence. 4 *Penmanship*: Marked on legibility, neatness, and general appearance. 5 *Copying from plain copy*: An exact copy of a few printed lines, in competitor's handwriting.

The following questions and tests indicate the general character of these subjects:

SPELLING.

Spelling is dictated by the examiner. The words are written by the competitor in the blank spaces indicated on the first sheet of the examination. The examiner pronounces each word and gives its definition. The competitor is required to write only the word and not its definition.

Sugar: A sweet substance made from the juice of the sugar cane. *Pledge*: Something given as security. *Cashier*: One who has charge of money in a bank. *Figure*: A mark representing a number. *Carrying*: Conveying or transporting in any way. *Breadth*: The measure from side to side. *Sheet*: The amount of paper made in one body or piece; as, a sheet of paper. *Easily*: In an easy manner. *Frontier*: The border or limits of a country. *Patience*: The habit of being

patient. *Guess*: The act of guessing; as, to guess at one's weight. *Threat*: The act of threatening; as, to make a threat. *Diamond*: A precious gem. *Visit*: To go to see; as, to visit a friend. *Repair*: To mend or make over; as, to repair clothes. *People*: The body of persons composing a nation; as, the American people. *Require*: To be in need of; as, to require money. *Grease*: Soft animal fat. *Answer*: To reply to; as, to answer a letter. *Exist*: To live; as, to exist in poverty.

ARITHMETIC.

1 (This question will consist of a short column of figures to be added.) 2 Divide 2,408,588 by 4,732. 3 Multiply 8,643 by 608, and then subtract 98,746. 4 A merchant who spent \$225, bought 65 pounds of butter at 30 cents per pound, 84 barrels of apples at \$2.25 per barrel, and spent the remainder for coffee. How much did he spend for coffee? 5 During the month of August 450,000 bushels of wheat were shipped from a certain port. During September 87,960 more bushels were shipped than during August. What was the total number of bushels shipped in the two months?

LETTER WRITING

The competitor is permitted to write on either one of two subjects given. The following subject has been used:

Write a letter containing not less than 100 words stating some of the advantages now derived by mankind from the art of printing. This exercise is designed chiefly to test the competitor's skill in simple English composition. In marking the letter, its errors in form and address, in spelling, capitalization, punctuation, syntax, and style, and its adherence to the subject, will be considered.

PENMANSHIP.

The mark on penmanship will be determined by legibility, rapidity, neatness, and general appearance, and

by correctness and uniformity in the formation of words, letters, and punctuation marks in the exercise of the fourth subject—copying from plain copy. No particular style of penmanship is preferred.

COPYING.

N. B.—Paragraph, spell, capitalize, and punctuate as in the copy. All omissions and mistakes will be taken into consideration in marking this subject.

Make an exact written copy of the following:

The present postal policy is to carry newspapers in some cases free, and in all other cases at much lower rates of postage than is charged for letters; the one being for the public weal, while the other is for private benefit. If the telegraph becomes a part of the service it will still be the duty of the Department to transmit telegrams for the press at much lower rates than for private individuals.

Directions for Rapid Computation.

Learn the following equivalents:

$\frac{1}{2} = .5$	$= 50\%$
$\frac{1}{3} = .33\frac{1}{3}$	$= 33\frac{1}{3}\%$
$\frac{1}{4} = .25$	$= 25\%$
$\frac{1}{5} = .2$	$= 20\%$
$\frac{1}{6} = .16\frac{2}{3}$	$= 16\frac{2}{3}\%$
$\frac{1}{7} = .14\frac{2}{7}$	$= 14\frac{2}{7}\%$
$\frac{1}{8} = .12\frac{1}{2}$	$= 12\frac{1}{2}\%$
$\frac{1}{9} = .11\frac{1}{9}$	$= 11\frac{1}{9}\%$
$\frac{2}{3} = .66\frac{2}{3}$	$= 66\frac{2}{3}\%$
$\frac{2}{5} = .4$	$= 40\%$
$\frac{3}{5} = .6$	$= 60\%$
$\frac{4}{5} = .8$	$= 80\%$
$\frac{3}{4} = .75$	$= 75\%$
$\frac{5}{6} = .83\frac{1}{3}$	$= 83\frac{1}{3}\%$
$\frac{3}{8} = .37\frac{1}{2}$	$= 37\frac{1}{2}\%$
$\frac{5}{8} = .62\frac{1}{2}$	$= 62\frac{1}{2}\%$
$\frac{7}{8} = .87\frac{1}{2}$	$= 87\frac{1}{2}\%$
$\frac{1}{11} = .09\frac{1}{11}$	$= 9\frac{1}{11}\%$
$\frac{1}{12} = .08\frac{1}{3}$	$= 8\frac{1}{3}\%$

In making computations use the simplest of these forms. For example: To divide by $.33\frac{1}{3}$ multiply by 3, which is dividing by $\frac{1}{3}$. To multiply by $.33\frac{1}{3}$ divide by 3, which is multiplying by $\frac{1}{3}$.

Practice using these equivalents so as to reach results in the quickest way. Care should be taken to place the decimal point correctly in all cases.

Learn the squares of numbers from 12 to 25 as follows:

13 square	$= 169$
14 "	$= 196$
15 "	$= 225$
16 "	$= 256$
17 "	$= 289$
18 "	$= 324$

19	"	= 361
20	"	= 400
21	"	= 441
22	"	= 484
23	"	= 529
24	"	= 576
25	"	= 625

Note the following:

25	×	25	= 625
26	×	24	= 624
27	×	23	= 621
28	×	22	= 616
29	×	21	= 609

Here the *tens* of both factors are the same and the sum of the *units* of the two is ten. In multiplying, multiply the units of the factors together and set down the result then add 1 to the tens of one of the factors and multiply by the other ten and place the result at the left of the first product. For example: To multiply 26 by 24: Say 4 times 6 = 24, then add 1 to 2 and say 3 times 2 = 6 and write the result 624.

To multiply by 99 add two zeros to the multiplicand and subtract the original multiplicand therefrom. Example: $147 \times 99 = 14700 - 147 = 14553$.

Proceed in a similar manner to multiply by numbers containing more nines.

In problems involving several multiplications and divisions use cancellation whenever practicable.

In all rapid work compute mentally as much as possible. Use few figures.

Computation Tests.

ADDITION.

\$40,255 81	\$10,433 27	\$2,596 23	\$5,492 45
59,748 60	54,125 77	4,750 00	8,691 49
57,137 50	223,215 22	1,299 06	1,896 32
129,640 05	3,737,869 31	9,842 34	27,010 52
91,187 77	67,325 47	3,929 90	5,974 70
58,576 59	1,123,768 94	10,406 07	18,478 72

342,369	95	473,213	18	6,211	37	9,442	83
66,553	63	107,750	91	1,212	51	3,865	02
60,739	55	224,562	50	2,607	30	2,737	97
45,573	01	7,897,798	43	2,737	13	10,289	67
825,963	21	113,868	00	13,623	58	33,516	13
97,330	77	9,181	23	3,359	58	6,612	02
58,026	30	10,400	00	4,507	02	5,184	83
52,677	83	2,329,463	29	6,343	94	7,464	50
37,620	62	9,897,743	43	19,099	81	27,272	63
68,529	11	4,213	00	8,349	29	15,216	06
68,609	83	729,687	24	3,247	39	6,621	28
64,047	11	413,333	33	56,574	82	185,977	58
40,367	10	6,666,666	66	9,793	44	23,821	43
42,174	60	21,444	44	2,856	17	2,856	17
95,773	42	366,917	29	7,451	67	14,790	75
39,083	47	233,411	18	282,021	67	1,026,567	44
46,208	45	125,916	68	8,259	66	13,212	54

SPECIAL TEST IN ADDITION.

Used by New York State Civil Service Commission.

Instructions to the Candidates: This envelope contains an exercise in addition. It is not to be opened until the signal to do so is given by one of the examiners. The exercise consists of columns of figures. Add as rapidly as you can, commencing at the right. You will be allowed precisely seven minutes after the signal to open the envelopes has been given. At the signal to stop you must turn the paper over at once.

53,119	409,042	40	45,162	99,969	77
62,816	58,026	30	21,680	15,589	01
41,230	52,677	83	88,348	18,675	54
183,714	37,620	62	197,419	18,424	01
49,381	68,529	11	897,586	34,105	90
36,248	68,609	83	680,554	29,033	83
193,475	64,047	11	886,792	19,810	78
59,246	40,367	10	123,859	20,833	50
209,618	42,174	60	112,371	11,405	76
165,234	95,773	42	31,821	36,679	88
216,301	39,083	47	73,386	12,167	07
58,563	17,713	00	21,360	15,459	69

COMPUTATION TESTS.

367

81,456 84	47,382	176,592
12,684 86	23,253	212,849
15,217 11	91,830	768,313
15,012 15	33,255	861,786
27,789 99	47,382	950,835
23,657 19	32,825	182,169
16,162 11	419,380	185,136
17,016 27	73,525	485,956
9,292 59	101,104	566,120
29,887 30	73,596	125,628
9,913 90	909,424	679,344
12,596 .8	77,892	572,732

Add the following:

\$7,324 34	\$23,325 41	\$7,544 39	\$14,212 35
8,979 20	9,604 94	27,242 31	45,204 95
30,092 04	67,318 71	1,668 94	1,952 06
2,686 28	2,751 61	4,913 14	10,834 63
4,836 96	4,836 96	5,743 00	8,374 14
6,159 23	6,469 57	10,237 58	10,466 25
9,561 34	14,866 17	4,880 80	5,558 61
3,492 35	3,492 35	4,608 24	6,640 03
11,783 23	18,178 40	5,244 98	8,857 56
30,781 42	128,045 64	6,853 13	9,162 65
6,888 85	10,849 38	22,842 85	35,975 65
7,871 96	9,600 73	6,576 48	7,516 18
8,525 98	11,068 35	4,809 50	6,381 64
3,771 89	3,771 89	7,428 24	8,129 53
3,704 58	3,802 59	6,566 06	6,664 06
1,814 76	1,814 76	15,873 83	15,873 83
3,327 26	3,327 26	5,551 51	6,106 83
33,471 76	154,034 73	3,515 80	5,245 50
7,733 73	10,951 22	7,504 33	9,610 06
5,580 10	5,823 78	11,967 01	19,656 89
5,618 68	5,618 68	8,117 80	10,562 16
3,789 24	4,876 34	6,629 07	8,589 30
8,678 34	10,663 29	32,847 95	122,771 98
6,341 89	7,000 02	11,835 43	14,017 61
4,900 29	5,250 69	4,761 87	5,605 88
2,803 66	2,803 66	3,496 35	4,189 37

4,481 81	4,481 81	4,210 37	4,471 70
3,906 81	3,987 81	1,363 17	1,363 17
14,095 47	21,658 64	36,509 32	53,589 88
10,894 27	26,182 67	3,092 35	5,803 28
2,946 78	4,408 49	4,980 24	5,955 68
3,018 40	3,372 29	8,764 16	8,764 16
5,170 16	5,170 16	6,901 43	9,689 28
5,532 47	5,710 48	.....	.....

1,202,316 04	1,870,777 81	895,878 32	2,766,656 13
799,661 44	1,231,273 27	646,025 77	1,877,299 04
493,247 80	749,604 76	361,543 20	1,111,147 96
136,547 18	206,369 15	138,647 01	345,016 16
127,175 74	192,715 22	305,081 63	497,796 85
240,453 88	360,299 68	235,091 36	595,391 04
378,250 77	512,125 71	215,857 47	727,983 18
32,024 50	48,125 42	100,842 82	148,968 24
19,542 30	31,009 20	60,432 01	91,441 21
60,516 28	91,531 30	131,626 37	223,157 67
213,775 16	324,553 94	280,565 54	605,119 48
166,807 83	249,210 80	407,421 76	656,632 56
69,276 70	102,530 41	54,553 91	157,084 32
55,832 19	85,935 39	114,773 49	200,708 88
81,326 47	123,600 24	144,424 55	268,024 79
303,446 33	467,514 44	242,450 82	709,965 26
105,791 33	160,557 34	70,640 43	231,197 77
99,221 49	152,879 02	166,052 98	318,932 00
69,775 14	105,581 88	227,836 10	333,417 98
998,405 31	1,477,292 76	1,427,327 91	2,904,620 67
36,648 02	56,375 15	134,291 30	190,666 45
21,676 55	33,838 11	96,051 40	129,889 51

\$8,736 96	\$12,666 82	\$23,643 16	\$36,309 98
85,576 66	124,063 37	60,447 85	184,511 22
13,802 93	20,083 11	29,974 78	50,057 89
72,241 13	108,080 71	199,333 81	307,414 52
5,244 97	7,285 79	27,185 54	34,471 33
896 32	977 98	7,041 92	8,019 90
28,626 27	40,812 13	55,450 01	96,262 14

COMPUTATION TESTS.

369

23,803 46	34,995 17	66,184 27	101,179 44
129,685 66	194,612 66	151,181 99	345,794 65
2,768 78	3,865 43	13,768 39	17,633 82
110,550 29	164,153 99	121,547 22	285,701 21
3,436 71	5,378 33	7,620 51	12,998 84
2,665 03	3,953 14	12,159 93	16,113 07
45,943 96	71,569 57	67,107 65	138,677 22
1,910 15	2,741 79	20,360 34	23,102 13
49 00	98 00	2,299 18	2,397 18
92,292 93	134,568 89	96,794 72	231,363 61
876,524 21	27,394 32	13,998 65	13,998 05
1,025 39	1,609 78	9,163 82	10,773 60
48,540 05	69,040 17	67,800 15	136,840 32
316,689 09	470,566 42	362,131 80	832,698 22
3,919 57	6,169 51	12,132 22	18,301 73

3,422,645 43	21,005 95	268,545 63	3,133,093 85
2,147,953 49	21,479 53	95,539 25	2,030,934 71
1,330,043 51	7,207 79	79,983 16	1,242,852 56
371,969 72	11,159 07	17,894 32	342,916 33
342,350 60	6,846 99	15,612 65	319,890 96
704,491 17	21,134 70	82,602 91	600,753 56
971,768 39	19,407 91	61,984 00	890,376 48
88,264 44	2,647 92	5,466 60	80,149 92
55,749 43	1,672 49	3,525 44	50,551 50
165,117 81	4,953 54	8,116 69	152,047 58
571,008 56	11,420 15	21,259 31	538,329 10
472,807 82	14,214 22	43,574 97	416,018 63
189,945 03	5,698 34	12,439 58	171,807 11
156,400 87	4,692 02	9,941 27	141,767 58
217,751 90	4,355 02	8,470 17	204,926 71
825,270 30	16,505 42	37,804 11	770,926 71
825,270 30	16,505 42	37,804 11	770,960 77
295,539 12	8,866 17	20,324 28	266,348 67
274,235 97	8,227 03	13,908 43	252,100 51
189,369 34	5,681 07	8,331 25	175,357 02
2,657,729 27	53,113 02	128,917 28	2,475,698 07
99,982 64	2,999 46	3,960 01	93,023 17
58,664 17	1,759 91	1,389 60	55,514 66

\$145 50	\$145 50	\$5,219 83	\$5,365 33
7,182 44	10,765 42	2,754 76	13,520 13
3,053 95	4,657 55	3,201 55	7,859 10
5,731 26	8,509 02	2,877 92	11,386 94
6,862 22	10,242 31	4,540 54	14,782 85
13 47	26 95	643 96	670 91
5,177 05	7,736 18	3,159 56	10,895 74
2,221 38	3,364 64	1,525 00	4,889 64
13,629 38	19,339 68	8,023 11	27,362 79
744 90	1,103 01	2,005 21	3,108 22
5,576 58	8,306 12	6,482 14	14,788 26
2,292 60	3,355 54	1,726 20	5,081 74
6,169 64	9,255 18	3,684 38	12,939 56
8,542 13	12,781 37	6,858 98	19,639 45
1,934 20	2,941 94	1,851 67	4,793 61

MULTIPLICATION.

Calculate and enter the market value of securities whose par value is stated in the first column, and which sell at the market rate indicated.

Par value	Market rate	Market value
10,775	106	
100,000	105%	
1,750,000	95¼	
110,000	107%	
107,700	113½	
99,787	103½	
12,348	132¼	
10,000	109½	
1,332,644	99½	
2,000,000	79%	

Multiply each of the following numbers by 99: 327, 9847, 5275, 348, 5796, 3298, 4476, 3944, 2876, 3333.

Multiply each of the following numbers by 16⅔: 696, 750, 1554, 414, 372, 270, 126, 378, 900, 798.

Multiply each number in the first column by the decimal opposite it in the second column:

8624	.75
9336	.66⅔
7500	.84

9764	.87½
2225	.98
3987	.33⅓
4896	.12½
5843	.62½
3847	.16⅔
9676	.33⅓

DIVISION.

Divide each number in the first column by the fraction opposite it in the second column.

333⅓	⅓
487	⅔
625	⅝
975	⅔
875	⅞
833⅓	⅝
325	⅑
525	⅘
676	⅕
375	⅑

Divide each of the following numbers by $12\frac{1}{2}$: 842, 976, 175, 900, 625, 936, 225, 764.

Divide each of the following numbers by $14\frac{2}{7}$: 396, 425, 532, 986, 734, 467, 585, 873, 468, 535.

Divide each of the following numbers by 75: 1312, 438, 522, 972, 645, 816, 183, 426, 762, 273.

MISCELLANEOUS.

Perform the following indicated operations:

625	×	425
875	÷	83⅓
598	×	999
676	×	125
301	×	184
824	÷	.025
824	×	.025
615	×	94
175	×	88
770	×	14⅔

Supply missing numbers in the following table:

Base	Rate per cent.	Percentage
775	$2\frac{1}{2}$	....
....	$3\frac{1}{4}$	65
96000	....	48
....	6	27.5
6750	112	....
3200	....	14400

Multiply each of the following numbers by $\frac{3}{4}$, and divide the result by $\frac{3}{4}$: 744, 228, 570, 1092, 294, 936, 225, 750.

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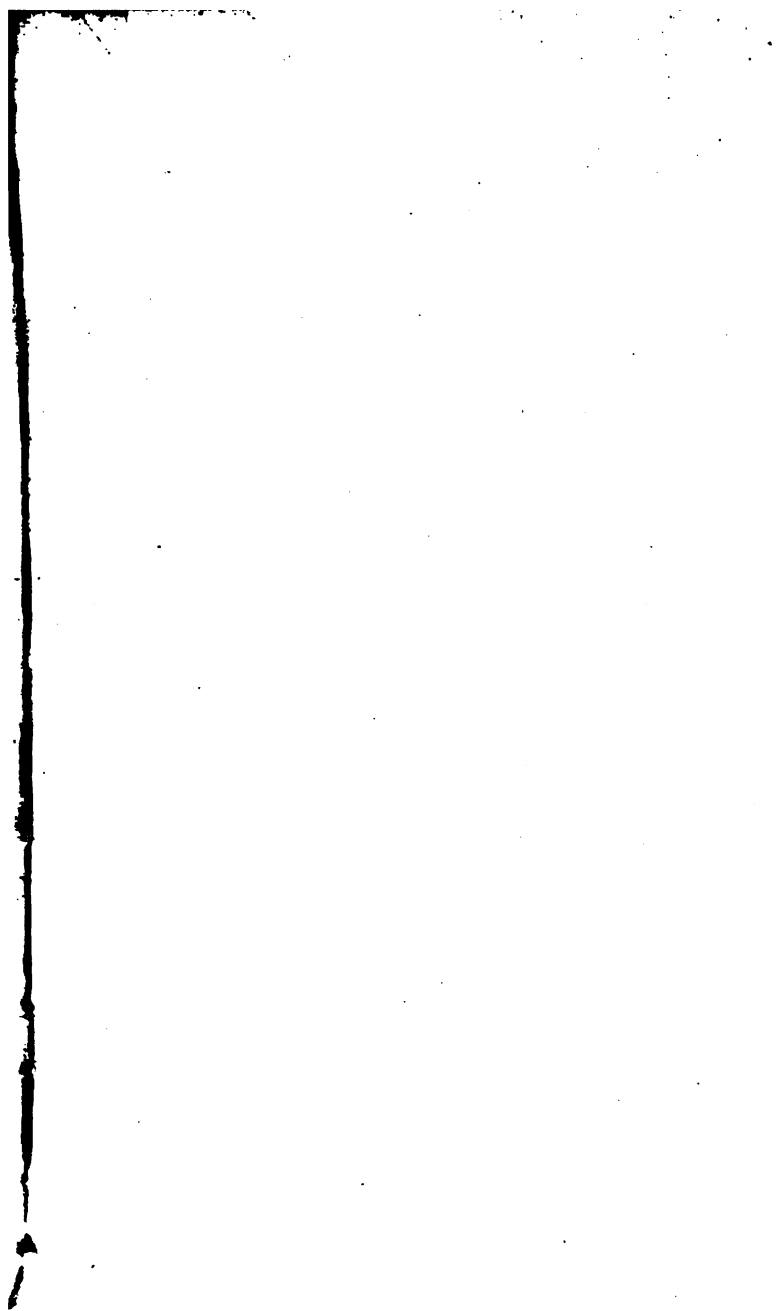
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